3 1761 07489620 1

Digitized by the Internet Archive
in 2011 with funding from
University of Toronto

http://www.archive.org/details/municipalprivate12nati

Municipal and Private Operation of Public Utilities

VOLUME II

.H
2772m

National Civic Federation

Municipal and Private Operation of Public Utilities

REPORT TO THE

NATIONAL CIVIC FEDERATION

Commission on Public Ownership
and Operation

IN THREE VOLUMES

PART II—VOLUME I

REPORTS OF EXPERTS—UNITED STATES

New York City
National Civic Federation, 281 Fourth Avenue
London Agents
P. S. King & Son, Westminster, S. W.
1907

94765
2/2/09

Copyright 1907
by the
National Civic Federation

MARTIN B. BROWN
PRESS
NEW YORK

COMMISSION ON PUBLIC OWNERSHIP AND OPERATION

EXECUTIVE COMMITTEE.

Melville E. Ingalls, *Chairman* (Chairman Board of Directors, Big Four Railroad), Cincinnati.
John Mitchell, *First Vice-Chairman* (President United Mine Workers of America), Indianapolis.
John G. Agar, *Second Vice-Chairman* (President Reform Club), New York City.
Edward A. Moffett, *Secretary* (Editor Bricklayer and Mason), Indianapolis.
Isaac N. Seligman, *Treasurer* (J. & W. Seligman & Co.), New York City.
Alexander H. Revell (President Chicago Civic Federation), Chicago.
George Harvey (Editor North American Review), New York City.
Samuel Insull (President Edison Company), Chicago.
John Bancroft Devins (Editor New York Observer), New York City.
Frederick N. Judson (Attorney-at-Law), St. Louis.
Carroll D. Wright (President Clark College), Worcester, Mass.
Hamilton Holt (Editor The Independent), New York City.
D. L. Cease (Editor Railroad Trainmen's Journal), Cleveland.
Franklin MacVeagh (Merchant), Chicago.
V. Everit Macy (Capitalist), New York City.
George H. Harries (Vice-President Washington Railway and Electric Company), Washington.
Louis D. Brandeis (Attorney-at-Law), Boston.
Marcus M. Marks (Manufacturer), New York City.
James O'Connell (President International Association of Machinists), Washington.
Lawrence F. Abbott (Editor The Outlook), New York City.
Alexander C. Humphreys (President Stevens Institute, Hoboken, N. J.)
J. W. Jenks (Cornell University), Ithaca, N. Y.
John F. Tobin (President Boot and Shoe Workers' Union), Boston.
Frank A. Vanderlip (Vice-President National City Bank), New York City.

COMMITTEE ON INVESTIGATION.

Melville E. Ingalls, *Chairman* (Chairman Board of Directors, Big Four Railroad), Cincinnati.

Albert Shaw, *Vice-Chairman* (Editor Review of Reviews), New York City.

Talcott Williams (Editorial Writer, the Press), Philadelphia.

W. D. Mahon (President Association Street Railway Employes), Detroit.

Frank J. Goodnow (Columbia University), New York City.

Walton Clark (Third Vice-President The United Gas Improvement Company), Philadelphia.

Edward W. Bemis (Superintendent Water Works), Cleveland.

John H. Gray (University of Minnesota), Minneapolis.

Walter L. Fisher (Special Traction Counsel for City of Chicago and ex-President Municipal Voters' League), Chicago.

Timothy Healy (President International Brotherhood Stationary Firemen), New York City.

William J. Clark (General Manager Foreign Department, General Electric Company), New York City.

H. B. F. Macfarland (President Board of Commissioners, District of Columbia), Washington.

Daniel J. Keefe (President International Longshoremen's Association), Detroit.

Frank Parsons (President National Public Ownership League), Boston.

John R. Commons (Wisconsin University), Madison, Wis.

J. W. Sullivan (Editor Clothing Trades' Bulletin), New York City.

F. J. McNulty (President International Brotherhood of Electrical Workers), Washington.

Albert E. Winchester (General Superintendent, City of South Norwalk Electric Works), South Norwalk, Conn.

Charles L. Edgar (President The Edison Electric and Illuminating Company), Boston.

Milo R. Maltbie (Member of the Public Service Commission), New York City.

Leo S. Rowe (University of Pennsylvania), Philadelphia. He resigned May 21, 1906, and was succeeded by

Edward A. Moffett, *Secretary* (Editor Bricklayer and Mason), Indianapolis, Ind.

EXECUTIVE SUB-COMMITTEE ON PLAN AND SCOPE.

Professor FRANK J. GOODNOW, *Chairman.*
Mr. J. W. SULLIVAN.
Professor EDWARD W. BEMIS.
Dr. MILO R. MALTBIE, *Secretary* until departure for Europe.
Mr. WALTON CLARK, *Secretary* after Dr. Maltbie's departure for Europe.

SUB-COMMITTEE ON FINAL CONCLUSIONS.

Mr. MELVILLE E. INGALLS, *Chairman.*
Dr. ALBERT SHAW.
Mr. E. A. MOFFETT, *Secretary.*

SUB-COMMITTEE ON SUMMATION OF EVIDENCE.

Professor EDWARD W. BEMIS.
Mr. WALTON CLARK.
Professor FRANK PARSONS.
Mr. CHARLES L. EDGAR.

Dr. MILO R. MALTBIE acted in Professor Parsons' place during his illness.

Mr. J. W. SULLIVAN acted in Mr. Edgar's place during his absence.

ERRATA

The following errors have been noted as the volume is passing through the press:

Page 379, line 12 from the top:

$2,170.00 should read $2,175.00.

Page 386, footnote:

This note should refer to the bonds issued by the Village of Lake View instead of the Village of Hyde Park.

Page 406, line 16 from the top:

$27,973.68 should read $27,933.68.

Page 500, line 22 from the bottom:

Mr. W. J. Clark should read Mr. Walton Clark. This report on the Philadelphia gas works was originally prepared by Mr. Walton Clark and not by Mr. W. J. Clark.

EDITORIAL NOTE

When the investigation was being planned by the Sub-Committee of Five, the various phases of the question of municipal *vs.* private operation of public utilities were grouped into four divisions: One included those relating to the history of the undertaking, the attitude of the public toward it, the franchises granted, the methods of public regulation and control, and the statutes and ordinances in force. The second covered wages, hours, conditions of labor, etc., the organization of the undertaking and the political phases of the problem. The third embraced engineering matters, and the fourth included the financial and accounting factors.

In order that each expert might know exactly what matters were to be reported upon by him and what were assigned to others, and in order that no detail should be overlooked, specific questions were prepared to cover every fact which seemed important or essential. The members of the committee and others interested in the subject of municipal ownership were asked to submit questions and to make suggestions. All were then considered, modified and arranged in systematic order by a sub-committee. Some matters were included that later were found not to be important, but it was thought wise to include too much rather than too little, to go too far into the details rather than to limit too narrowly the investigation.

Further, in order that the Commission might have before it all the available facts germane to the problem, whether called for in these specific questions or not, the experts were instructed as follows:

"The purpose of this investigation is to obtain all the essential facts to enable the Commission to determine the relative superiority of municipal or private operation of public service industries and the conditions most favorable to efficient management. For this purpose, the following schedules have been prepared. It is believed that they cover the essential points upon which data subject to quantitative measures may be obtained. • • • If any facts should be discovered that are relevant to the investigation, but which are not called for in the following schedules, full memoranda should be made upon separate sheets and sent to the Committee."

After the specific questions had been decided upon, they were classified into the four divisions above mentioned and called: Schedule I—General, Historical and Legislative; Schedule II—Organization, Labor and Politics; Schedule III—Engineering Matters; Schedule IV—Finance and Accounting.

These Schedules for the undertakings in the United States were then assigned to the following persons:

Schedule I—all undertakings, except the Massachusetts and Chicago electric light plants—Prof. John H. Gray.

Schedule I—Chicago electric lighting plant—Mr. William Hard.

Schedule II—all undertakings, except the Massachusetts electric light plants—Prof. John R. Commons and Mr. J. W. Sullivan.

Schedule III—water works—Mr. Dabney H. Maury.

Schedule III—gas works—Mr. Alfred E. Forstall and Mr. Frederick Burnett.

Schedule III—electric lighting plants, except those in Massachusetts—Mr. Charles E. Phelps, Jr., and Mr. Theodore Stebbins.

Schedule IV—all undertakings, except the Massachusetts electric light plants—Messrs. Marwick, Mitchell & Co.

Schedules I, II, III and IV—electric lighting plants in Massachusetts—Mr. Charles E. Prichard and Mr. Alton D. Adams.

The duty of the experts was to report the facts in accordance with the prescribed forms. They were neither asked nor expected to draw conclusions, nor even to tabulate or arrange the facts, but to fill out the printed blanks, and to leave the work of analysis and of drafting conclusions to the members of the Commission or duly appointed committees. This fact should be kept in mind in reading the following pages, for no attempt has been made in this volume to analyze the data collected or to put the facts into a readable report, but merely to transcribe into a form as succinct as possible the answers given by the experts in the various Schedules for the United States. The analyses of these Schedules appear in Volume I.

Owing to the importance which has been attached previously to the experience of the Philadelphia gas works, under municipal and company management. Professor Leo S. Rowe was asked to prepare a paper upon "The Relation of the City of Philadelphia to the Gas Supply," which appears in this volume.

The transcription of the schedules for this volume was performed under the direction of Professor John H. Gray, to whom the committee is greatly indebted for the care with which this laborious task has been performed. In order that every possible precaution should be taken against errors in transcription and in order that every expert might examine before publication the facts he had reported, the printed proof was submitted to him for approval, and printing was not begun until this proof had been corrected, approved by him and returned. Of course it is likely that some errors have crept in, due to human fallibility, but it is to be hoped they are few.

In addition to the matter printed in this volume, the experts have submitted many exhibits, including maps, plans, photographs, printed documents, statutes and bound volumes. It has not been considered necessary or wise to attempt to reproduce them, as they constitute a small library by themselves; but all will be deposited in the Library of Columbia University, together with the original Schedules, where they may be consulted.

The undertakings in the United States selected for investigation by the committee were those in the following cities:

GAS.

Public.	*Private.*
Wheeling, W. Va.	Atlanta, Ga.
Richmond, Va.	Norfolk, Va.
	Philadelphia, Pa.

WATER.

Public.	*Private.*
Cleveland, O.	New Haven, Conn.
Chicago, Ill.	Utica, N. Y.
Syracuse, N. Y.	Indianapolis, Ind.

ELECTRIC LIGHT AND POWER.

Public.	*Private.*
Chicago, Ill.	Chicago, Ill.
Allegheny, Pa.	Pittsburgh, Pa.
South Norwalk, Conn.	Geneva, N. Y.
Detroit, Mich.	Toledo, O.

An investigation of the following Massachusetts electric plants, although not so comprehensive as in the other instances, was also planned:

Public.	*Private.*
Danvers,	Northampton,
Holyoke,	Salem,
Westfield,	Beverly,
Marblehead,	Gardner,
Peabody,	Abington,
Taunton,	Attleboro,
Chicopee,	Fitchburg,
North Attleboro.	Uxbridge and Northbridge.

All of these undertakings—public and private—were examined and reported upon by the experts, except in the following instances:

The Richmond gas works was reported upon by Professor Commons and Mr. Sullivan, but the authorities refused to allow the other experts to continue the investigation.

The Norfolk gas company was reported upon by Professor Gray, Mr. Forstall and Mr. Burnett, but not by Professor Commons, Mr. Sullivan and Messrs. Marwick, Mitchell & Co.

The United Gas Improvement Co. of Philadelphia was reported upon by Professor Rowe, but by none of the other experts, although a special report was prepared by Mr. Walton Clark, the 3rd Vice-President of the Company, and revised by Mr. Sullivan.

No report by any expert was prepared for the Utica water works company.

None of the private electric lighting plants outside of Massachusetts were reported upon by any of the experts, the companies not having been given permission to make an investigation in these instances. In fact, in no instance was it possible to secure as complete data relating to financial matters from private plants as from municipal undertakings. All the municipal plants were fully reported upon by each expert, except Richmond, as above stated.

To Mr. Fay N. Seaton the committee is indebted for valuable editorial assistance, and particularly for the Index to this as well as to the other volumes.

M. R. M.

New York, October 1, 1907.

TABLE OF CONTENTS

PAGE

Membership of Committees.. V

Editorial Note XI

PART I—WATER WORKS.

General History and Legislation (Schedule I):
By Professor John H. Gray.. 1

Labor and Politics (Schedule II):
By Mr. J. W. Sullivan and Professor John R. Commons..... 136

Engineering Matters (Schedule III):
By Mr. Dabney H. Maury.. 159

Finance and Accounting (Schedule IV):
By Messrs. Marwick, Mitchell & Co.......................... 353

PART II—GAS WORKS.

General History and Legislation (Schedule I):
By Professor John H. Gray 426

Labor and Politics (Schedule II):
By Professor John R. Commons and Mr. J. W. Sullivan..... 490

Engineering Matters (Schedule III):
By Mr. Frederick Burnett and Mr. Alfred E. Forstall..... 537

Finance and Accounting (Schedule IV):
By Messrs. Marwick, Mitchell & Co.......................... 568

The Relation of the City of Philadelphia to the Gas Supply:
By Professor Leo S. Rowe.. 588

PART III—ELECTRICITY SUPPLY.

General History and Legislation (Schedule I):
By Mr. William Hard and Professor John H. Gray......... 605

Labor and Politics (Schedule II):
By Mr. J. W. Sullivan and Professor John R. Commons..... 749

Engineering Matters (Schedule III):
By Mr. Theodore Stebbins and Mr. Charles E. Phelps, Jr... 779

Finance and Accounting (Schedule IV):
By Messrs. Marwick, Mitchell & Co.......................... 803

SUPPLEMENT

Labor and Politics—Answers to Schedules:
By Professor John R. Commons and Mr. J. W. Sullivan..... 885

PART IV—MASSACHUSETTS ELECTRICITY WORKS.

By Mr. Alton D. Adams and Mr. Charles Prichard.

PAGE
General History and Legislation (Schedule I) 909
Labor and Politics (Schedule II) 946
Engineering Matters (Schedule III) 985
Finance and Accounting (Schedule IV) 1101

INDEX:

By Mr. Fay N. Seaton 1214

GENERAL HISTORY AND LEGISLATION

United States Water Works

(Schedule I)

By JOHN H. GRAY

A—HISTORICAL AND GENERAL.

A 1. Date when this establishment began to sell water.

Chicago. February, 1854. *Cleveland.* September 24, 1856. *Syracuse.* January 1, 1892, from the city owned works. Previous supply was provided by private parties; was begun in 1842. *Indianapolis.* June 1, 1871. *New Haven.* January 1, 1862.

A 2. If it is a municipal plant, was water being supplied by private company when city began operation?

Chicago. Yes. *Cleveland.* No, but on January 23, 1833, an act was passed to incorporate the Cleveland Water Company, capital from $25,000 to $50,000, at the discretion of the company, par $50.00. The company was given the right to condemn private property, and to lay pipes in the streets, the streets to be restored to good condition. Penalties were prescribed for injuring the property of the company. Section seven required free water for fire purposes, and permitted the company to charge such rates to private consumers and for public use as might be mutually agreed upon. The act was declared a public act to be "benignly construed." The right was reserved by the legislature to alter or repeal the charter of the company, reserving the property rights of the company. Cleveland became a city in 1836. The company's charter was amended March 19, 1850, and the company authorized to furnish water to the city of Cleveland, and all Cuyahoga County. The authorized capital was raised to a total of $200,000. I find no evidence that the company constructed any works, or attempted to supply any water. On February 8, 1850, the charter was accepted, and $27,000 of the capital stock subscribed. The company was organized May 4, 1850, and officers elected.

The history of this enterprise is written in the report of the committee of the Council on the subject of a pure water supply submitted February 24, 1853. The committee declared, page twenty-five, "that such undertakings can be carried on more economically by individuals or companies, than by municipal corporations, and also better managed after constructed." However, the committee found that the works could not be made to pay private capital for some time, and that no capitalists were willing to undertake them unless the city would assume one-third of the expense. The committee found that the general municipal law, May 3, 1852, sections twenty-two and seventy-five, provided for either public works or private works, but not for a joint enterprise, or "mixed affair." The committee also referred to the company already organized, but were not quite sure of the "vitality of its provisions since the adoption of the new constitution" (1851). The committee recommended strongly against allowing the power of constructing, or later, buying the works, to pass from the city, and said that the law did not permit the taxing of lands for water rents, except as part of the general taxes.

Syracuse. Yes. *Indianapolis* and *New Haven.* ———.

A 3. Character of original organization, whether individual, firm, corporation, municipal, or other form.

Chicago. Private corporation, Chicago Hydraulic Company, act of January 18, 1836. *Cleveland.* Municipal. *Syracuse.* A special act March 27, 1821, authorized the inhabitants of the unincorporated village to elect three water trustees to procure water for the village and the inhabitants from any State lands on the east of the village, so far as such water was not needed for the Erie Canal. Nothing is said in the act as to the sources or method of raising funds for this purpose, but the village probably had the right to meet the expenses from the general fund of the village. A special act of April 13, 1825, incorporating the village of Syracuse, transferred all the rights and powers of the water trustees (act of 1821) to the village trustees. By act of April 23, 1829, section two, the village trustees were authorized to transfer to Oliver Teal, his heirs and assigns, for twenty years, all their powers in regard to the water supply. The trustees retained the right to resume these powers again, by paying said Teal the appraised value of any aqueducts laid, in case he did not furnish water within a year. Maximum rates: Family, $5.00; boarding house, $10.00; tavern, $20.00, a year. The rates fixed, however, seem to have been prohibitively low. To remedy this fault, all the rates were doubled by act of March 29, 1842. April 23, 1830, these rights all reverted to the village trustees, who did nothing until June, 1841, when, under authority of an act of 1834, they retransferred all their water rights to said Teal for a period of thirty-five years, with the right to retake them again in case he did not furnish water within two years, and with the privilege of taking the works at the end of thirty-five years by paying the actual cost, less actual depreciation, to be determined in case of non-agreement by commissioners appointed by the Supreme Court. Teal began to lay pipes (wooden logs bored) in the autumn of 1842. November 8, 1847, the village trustees voted that Teal or his assigns might introduce water into Syracuse from any spring, provided the water was better than that already furnished.

Under these rights the partnership promoted by Teal (Teal, Seymour & Burt) furnished water until the Syracuse Water Company was chartered, April 15, 1849. This company was organized by Teal, and all his rights and property connected therewith passed to the company. Meantime Syracuse, by act of December 14, 1847, became a city with all the rights of the village over the water supply. Section nineteen of the company charter specifically reserved the right of the city to compete, by declaring the act of March 27, 1821, and all acts amending that act, still in force. The company was given the right to condemn land and water rights; and made subject in laying its pipes within the city "to such regulations as the Common Council thereof shall prescribe;" capital stock, $60,000.00, par $50.00. The directors of the company were made individually responsible for any debts of the company in excess of 50 per cent. of the stock. By section twenty-six it was provided that unless the company began within two years to furnish a sufficient supply of good and wholesome water, and kept up such a supply of such water, and if it refused after six months' written notice to fulfill this obligation, the city might apply to the Supreme Court to appoint five commissioners to appraise the property, and if, at the end of the six months' notice, the company still failed to meet the obligation, the city might take possession of the works upon paying the appraised valuation, and exercise all the powers given to the company under this act.

By section twenty-nine, the city was given the right to purchase the property and franchises of the company at any time after twenty years by paying the cost of the works, plus 15 per cent. annually, less the dividends actually paid. By section twenty-seven, private rates for water not carried more than twenty feet above the canal level (nothing said about higher levels) remained the same as under the act of 1842. By section sixteen the price for public water in case of non-agreement was to be fixed for the first ten years by three arbitrators appointed by the Supreme Court, provided that the maximum rate per hydrant should not exceed $10.00. After the first ten years, rates could be so fixed every three years. By section twenty-eight, the company is required to report under oath annually to the City Council in detail in a form prescribed by the Council as to the status, condition and operation of the company.

In April, 1851, the city requested the company to supply water for public uses, and thereafter made contracts for the same. The company proceeded to build works, and to take water from springs until 1871, when it began to pump from Onondaga creek and delivered water through its distributing system in the city virtually unmolested until about 1885, although the Central City Water Company is said to have sought a franchise in 1871 (Council proceedings, 1887, page 91). This Onondaga creek supplied water until 1885, and it was never satisfactory, although this source was approved originally by the City Council. The water became much less satisfactory as time went on. About 1885, after great agitation, the company supplemented its supply by gang wells. This water was declared by the investigating committee of 1888 and 1889 (report presented in print) to be suspicious in quality, and uncertain in quantity. The company seemed wholly stupid, and totally indifferent to the needs and desires of the people, until the agitation for public ownership had gone too far to be opposed successfully. See letter of the president of the company in the *Syracuse Herald* of March 23, 1885, in which he intimates that the company assumes no responsibility for the quality of the water; but considers that the city government, by originally approving the *source* of supply for the company, thereby entered into a contract with the company to supply from that source. This is the same letter in which he set up the claim of an exclusive contract, and threatened to resort to the courts to maintain all of their contract rights. These threats did not prevent the granting of the franchise of the Central City Water Company by a unanimous vote, the same day that this letter was published. A threat such as this proved the indifference and the self-satisfaction of the company, and the hopelessness of an adequate water supply of good quality from that company. The highest courts of the State rejected every important claim of the company. When it was too late, the company woke up, and offered to give an adequate supply of pure water. It never furnished wholesome water, or water fit for boiler purposes. It never gave proper pressure for fire protection. It never carried water to any of the high levels of the city. Water was generally supplied to the low levels from a head of 110 feet. When the city took the works of the company, January 1, 1892, the company had but from 33.17 to 37.04 miles of street mains, of which 25.48 were six-inch or smaller (Report, "Water Supply of Syracuse," 1889, page 57, gives 33.17 miles, page 60, 37.04 miles), with 172 miles of streets, and about 387 fire hydrants. Length of mains January 1, 1906, 179.3 miles, with street mileage of 240.

Such was the intolerable condition when, in 1885, the agitation in favor of the city's buying the company (a thing provided for in the charter of the company) arose, and when the Central City Water Company organized under the general law of 1880, and sought a franchise, which was granted March 23, 1885. This company was to furnish water approved by the State Board of Health and the city government. The agitation for public ownership was so strong, however, by the time this franchise was granted, that the city held the company up, and never approved a source of supply for it. For the next three years, the water question was the all-absorbing one for the city and citizens of Syracuse. The citizens were well organized. On March 17, 1886, a special act of the Legislature was obtained, authorizing public ownership upon approval by popular vote at a special election April 27, 1886. The company is said to have spent $3,000.00 to carry this election. The proposition was defeated by a majority of 4,076, out of a total vote of 8,660. The agitation then became more intense, and on June 27, 1887, the Council granted an ordinance to the Salmon River and Onondaga Water Company, by a vote of eight to three. The Mayor vetoed this ordinance on the ground, first, that there were too many companies already, and second, that, even if there were no other companies, this ordinance did not protect the interests of the city. But four out of eleven Aldermen voted to pass the ordinance over the Mayor's veto. The Mayor demanded that no more ordinances be granted, that the source of the Central City Water Company be not approved, but that a thorough investigation of the whole question be made. By chapter 532, laws of 1888, such an investigation was authorized to be made by a commission appointed by the Mayor to report on every phase of the subject.

The commission was appointed by the Mayor on June 21, 1888, and after having the time for its report extended by act of January 10, 1889, reported in print February 1, 1889 (74 pages with 36 maps, exhibits, etc.). The high character of the commission is indicated by the fact that although the commission made a careful and highly valuable report, it spent in all but $11,147.61, out of the total appropriation of $12,000. By this time the Syracuse Water Company began to realize the situation, and offered to furnish an adequate supply of good water with sufficient pressure. By act of May 15, 1889, the city was authorized to establish publicly owned works; to purchase the property of the old company at an appraised valuation, and to take water from Skaneateles Lake, with the consent of the State Canal Board. This act was made subject to approval by popular vote. At the special election June 4, 1889, the vote was: For municipal ownership, 11,302; against municipal ownership, 910. The Syracuse Water Company failed to agree with the city as to the price of its property and rights. It claimed a cost of plant of $773,948.87; share capital outstanding, $572,000; bonds, $800,000, "largely in estates for the benefit of women and children." The city thereupon, in accordance with the company's charter, petitioned the Supreme Court to appoint appraisers of the property. On December 18, 1891, the appraisers reported to the court, fixing the amount to be paid by the city for the property and rights at $850,000; and the court confirmed this award, together with $5,498.02 for work and material during the proceedings, and ordered that the water rates collected in advance and the taxes paid by the company be *pro rated* on the date of turning over the works, which date was January 1, 1892. The city has operated the works from that date. It may be interesting to note in this connection that the company had issued its share capital largely against improvements made out of earnings. In the twenty years up to 1880 it had paid three cash dividends in all. After 1880, it had paid 6 per cent annually. Furthermore, the property taken over from the company by the city was of comparatively little use for the purposes of a modern water supply. A large portion of the street mains consisted of cement pipes, which were not strong enough to sustain the pressure of the new water system. Another large portion consisted of iron pipe too small for an adequate system of water supply. Inasmuch as the Skaneateles system was to be wholly a gravity one, all the pumps, buildings and apparatus connected therewith, were wholly useless. The most careful estimate that I have been able to obtain from any one connected with the old system, is that the city abandoned as useless for its purpose about $50,000 of the company's distributing system alone. The land purchased from the company by the city, not being needed for the water supply, was for the most part converted into a city park.

The act of 1889, chapter 291, authorized the city to buy out any company that had water rights in Syracuse. I have been unable to find that the Central City Water Company had acquired any legal rights under the ordinance of March 23, 1885, which the city ever had to condemn or pay for; the company seems simply to have dropped out of existence before the city approved its source. It is worthy of note, however, that before the city petitioned for appraisers of the Syracuse Water Company's property, that company entered suit against the city, and also against the Central City Water Company to prevent that company from gaining entrance into the city. The Syracuse company claimed exclusive privileges, and that if these privileges were not exclusive, at least the city could not provide for water from other sources until it acquired the rights of the Syracuse Water Company. The cases were carried to the Court of Appeals, and decided October 8, 1889, adversely to the Syracuse Water Company (116 N. Y., 167).

The act of 1889, chapter 291, gave the city full authority to establish a bi-partisan Water Board, six members, six year terms. These commissioners were given full power to acquire the rights and property of any water company in Syracuse; to establish and operate a system of water works for the city, and to take lands and water rights by condemnation for this purpose. The city, however, according to the report of 1889, had determined to use Lake Skaneateles as its water source. Under section 18 of the act of 1889, it could take this water only with the consent of the Canal Board (Skaneateles was a feeder of the Erie Canal), and to the extent granted by the Canal Board, and was required at the request of the Canal Board to furnish a compensating supply of water from other sources for the water taken from Skaneateles. The act authorized the necessary loans, $3,000,000 (the amount has been increased by later acts to $4,100,000), for the purposes of the Water Board, to be voted by the City Council upon the request of the Water Board as needed. The act required the water fund to be kept separate for the use of the department, and an annual report to be made to the Council by the board. By amendment to the act of 1889, passed May 9, 1890, chapter 314, the relations of the Water Board to the Erie Canal were much more clearly defined. The city was required to raise the dam, so as to retain all of the water of the Skaneateles water shed, to extinguish all the water rights on the outlet of the lake, to carry on its work with the approval of and under the direction of the State Superintendent of Public Works, and the State Engineer, and to take the water from Skaneateles through a pipe not exceeding thirty inches in diameter. (The water consumption of the city now, August, 1906, just about equals the capacity of this pipe or conduit, namely, 13,450,000 gallons per day. During thirteen days in February, 1905, the daily consumption of the city exceeded the capacity of the conduit by 400,000 gallons. (Syracuse Journal, August 17, 1906.) The dependence of the city of Syracuse upon the Canal Board and other State authorities in establishing the new system made it possible for the old water companies and other private interests to create an almost unparalleled opposition to the new scheme. Several hearings were held by the State Canal Commission, and almost every city along the line of the Erie Canal, and various commercial bodies, including the Produce Exchange of New York City, appeared before the Canal Board in opposition to the City of Syracuse. On December 27, 1889, the Canal Board refused its consent for Syracuse to take the waters of Skaneateles. The result was a renewed attack upon the Legislature for such power, and the act of 1890. Almost endless opposition in the courts was then made to the condemning of the water rights along the outlet of the lake. The city persevered with these cases, which were carried to the highest court, and then reargued before that court. The city finally obtained all the water rights necessary, the right of way for the conduit, and the property and rights of the old company. The printed report of the water rights cases fills thirteen large volumes up to July 1, 1898, when most of the litigation over the establishment of the works was completed. The legal expenses alone, apart from the damages awarded, amounted to $269,060.41 (Ninth annual report of Water Board, p. 35).

Indianapolis. Corporation, Water Works Company of Indianapolis.

New Haven. Corporation. Special charter, 1849.

A 4. Character of present organization, whether individual, firm, corporation, municipal, or other form.

Chicago. Bureau of Water, Department of Public Works, City of Chicago. *Cleveland.* Municipal Board of Public Service, Water Works Division. *Syracuse.* Municipal Water Board, Public Works Department. *Indianapolis.* Corporation. *New Haven.* Corporation, The New Haven Water Company, special charter, 1849, with amendments.

A 5. Date and character of all changes in ownership since origin.

A 6. State method of making each change.

Chicago. The private company, chartered January 18, 1836, was delayed in its construction on account of the panic of 1837, but began building in 1840, and commenced the supplying of water in 1842, probably about May 23. The inlet pipe was extended into the lake but 150 feet, and the distribution made through wooden pipes bored at the works, the largest of which was six inches. According to the annual report of the Department of Public Works for 1904 (p. 232, Spengler), the Chicago Hydraulic Company distributed water through two miles of wooden mains, varying from five to three inches in diameter. "The works of the Chicago Hydraulic Company were operated with varying success until 1852, during which year, as a result of a legislative act passed February 15, 1851, the rights and franchises of the company were taken over by the city, and new works commenced." According to this report, the reservoir of this company, corner of Lake and Michigan Streets, was 25 ft. square, 8 ft. deep, and elevated 80 ft. above the surface of the ground, and the intake pipe of iron extended 150 ft. into the lake. Before the company went out of existence November 1, 1854, it had 9¼ miles of pipe. It is supposed, but the fact is not certain, that at a later date the intake pipe was extended into the lake nearly 700 feet. The company never extended its pipes to the north division of the city. The total expenditure of the company up to 1852 amounted to about $50,000 (Council Proceedings, March 22, 1852). Although the company had the right to pipe the whole city, the north division complained bitterly from the beginning because it had no water, and the growth of the city was so rapid that the company could not furnish an adequate supply in the south and west divisions. At the same time, the growth of the city, because of the shortness of the inlet pipe, polluted the water. An outcry was raised all over the city against what was called the "water monopoly" furnishing polluted water. The result was a petition signed by the City Council and Mayor and nearly all of the citizens to the Legislature of 1851 to authorize a public water supply. This was done by act of February 15, 1851, creating the Chicago City Hydraulic Company.

This was an incorporation of three commissioners, named in the act, for three, four and five years respectively, as a quasi-municipal public authority, with but a vague dependence on the city government, but depending upon the credit of the city. This company or board occupied somewhat the same relation to the city government that the present Board of Education does. It was authorized to borrow $250,000 on the credit of the city to establish and operate a complete system of water works for the whole city; to establish water rates at its own discretion, to be a lien upon the property just as special assessments for street improvements are.

The private company claimed an exclusive franchise, and attempted to enjoin the Water Commissioners from either paralleling their pipes, or collecting water rates from takers of water from the private company, as the act creating the Water Commissioners permitted. Judge Dickey, January 11, 1853, decided that the franchise was not exclusive, and that, therefore, the city might compete, although it thereby destroyed the value of the private company. The act creating the commissioners authorized, but did not compel them, to buy out the private company, but forbade them to pay more than the cost to the company. (Apparently such a provision, provided the property was worth more than its original cost to the company, amounted to confiscation under the Federal Constitution; or would have amounted to confiscation had the company been compelled to sell.) The act apparently, however, did not contemplate expropriation or compulsory sale. The commissioners took the opinion of Chancellor Walworth of New York on their rights. He declared that the property of the private company could be taken only by condemnation at its actual value, irrespective of its cost, and including the value of its franchise. The company finally agreed to sell its rights and property at the original cost, to be determined by the court, to which it agreed to submit all of its books and records, and claimed a value of $50,000, and an annual income of $10,000, which income would be $15,000 at the rates proposed by the city. The commissioners claimed the works were not worth more than $15,000 to $20,000. On March 29, 1853, the City Council authorized the commissioners to buy out the old company at $30,000 for the rights and property, or $15,000 for the franchises alone.

The records at this point are defective, but from incidental references and the newspapers of a later date (See Democratic Press of July 29, 1854, and especially p. 40 of the Seventh Semi-Annual Report of the Water Commissioners, January, 1855), it appears that the commissioners bought the old works, and used the distributing system of that company for some time. It seems that the distributing system of the old company was abandoned November 1, 1854. (See Democratic Press, July 29, 1854, p. 5.)

Cleveland. ———.

Syracuse. ———.

Indianapolis. The Water Works Company of Indianapolis, organized in October, 1869, under general act of March 6, 1865, was the only company ever organized under this general act. The company obtained its street rights from the city by ordinance contract of January 3, 1870. The Indianapolis Water Company was organized under general statute of February 4, 1881 (chapter 38), entitled "An act in relation to the formation of water works companies by purchasers of the property of bankrupt water works companies at judicial sales." The old company had become bankrupt, and was sold at judicial sale, and the act of 1881 specifically authorized the purchaser or purchasers of such company to form a new corporation, which was done. The act of 1881 specifically gave all of the rights and privileges, and imposed all of the obligations and duties of the bankrupt company on the new organization.

New Haven. ———.

A 7. State terms of each arrangement.

Chicago, Cleveland, Syracuse. ———.

Indianapolis. The company, having been adjudged bankrupt in the sum of $1,130,150.10, plus costs of $351.50, was by decree of the Superior Court of Marion County, Indiana, of March 12, 1881, ordered sold. Under this decree, after the amount of the judgment had been reduced by $29,710.70 paid to the sheriff from the sinking fund of the company, the property was sold for $500,000, and transferred to the trustees for the new company (the present one) on April 21, 1881. The new company received the certificate of incorporation from the Secretary of State on April 23, 1881.

New Haven. ———.

A 8. State fully reasons for each change.

Chicago. The old company used wooden pipes only, with an intake very near the shore; furnished poor water, and, assuming that it had an exclusive franchise for the whole city for seventy years, showed no inclination, with its single pumping station, to furnish either an adequate supply to meet the phenomenal growth of the city, or water of a good quality; nor did the public agitation (and charter of the Lake Michigan Hydraulic Company, March 1, 1855, for supplying the North Side) or any other threats of competition, cause them to show any signs of meeting the emergency in an adequate manner.

Cleveland. ———.

Syracuse. ———.

Indianapolis. Bankruptcy. It is impossible at this date to determine accurately the cause of such bankruptcy. The managers of the company are supposed to have been without much experience, to have managed somewhat recklessly and extravagantly, and to have extended their water system much more rapidly than consumers could be obtained in paying numbers. In fact, the inhabitants, having always depended on surface wells, and being, from the nature of the circumstances, fully supplied with wells, felt but little desire or necessity for the city water.

The investigating committee, reporting October 26, 1904, found that, with an adequate supply of water from the water works, there were still 25,000 private wells used in Indianapolis, with an estimated population of 40,000 families. There were but 8,833 customers of the water company using water for water closets (p. 31). The same report (p. 32) shows that from 1898 to the date of the report, the city Health Department had condemned 1,624 wells. There is no legal authority in the city government to compel the discontinuance of these wells and the connecting of the premises with the water works. Under these circumstances it does not seem strange that the company became bankrupt.

New Haven. ———.

A 9. Has there ever been municipal ownership and private operation of plant?

Not in the case of any plant in any city, except that the territory of Brightwood (estimated population, 2,500), annexed to Indianapolis in 1897, had before annexation, and still maintains public water works, supplying that territory. The history of the Brightwood municipal water works is explained more fully elsewhere.

A 10. Is the general sentiment favorable or unfavorable to the present system of ownership and operation?

A 11. What is the attitude of the press?

Chicago. Favorable to public ownership, with more or less criticism of the management of the department. While there is no suggestion of a change of form of ownership, and but little criticism of the management of the water works, it may safely be said that the question of public ownership of street cars has occupied the center of the stage in Chicago for about ten years. In discussing this question, the papers hostile to public ownership of street cars always declare that the water works are inefficiently and, sometimes, dishonestly managed, incurring a heavy loss for the city.

Although but little is said about the matter, logical objections to the present system are that the pressure in all parts of the city and at all times is too low, and that from a sanitary standpoint the water from some one or more of the stations is officially declared unsafe by the Board of Health nearly a quarter of the time. The evil is intensified from the fact that the manner of publishing these reports permits the use of bad water for nearly twenty-four hours before the fact is brought to the consumer's notice, and from the further fact that the distributing pipes from all the stations are so interconnected that one is never sure from which station he is receiving water at any moment. In fact, by the time that the consumer is informed that the water is bad from the station from which he is presumed to draw his water, a change of wind, driving the sewage away from that particular intake, may have caused the water to be perfectly safe. So far as an inference can be drawn from general observation, the great mass of the population, being uneducated and uninformed, and relatively poor, drink the water habitually without boiling or filtering, while the relatively small portion of the population possessed of some scientific knowledge take the precaution to boil and filter the water without reference to the daily reports of the Board of Health, or adopt the alternative policy of not using the city water in any form for drinking purposes. The extent and evil of drinking unboiled and unfiltered water can be determined alone by the rate of sickness and death.

Cleveland. Entirely favorable to the form of ownership. More or less criticism, centering chiefly about the charge that the Superintendent "kills" bills in a somewhat arbitrary and unjustifiable way, instead of collecting the bill, giving a refund for errors, and making the matter in that way the subject of more systematic record. It seems that the Superintendent, in case bills are complained of, uses his own judgment in reducing them by destroying those bills and issuing new ones for what he considers the correct amount, without making any permanent or systematic record of the fact or the reasons for the reduction. At least, such is the charge. On the eve of the recent election last fall, the Council started a general investigation of the Water Department, and attempted to make some capital out of the above allegation. A comcil committee employed the Audit Company to examine the books and records, and the accountant prepared a rather adverse report, which I understand the committee refused to accept. The committee thereupon employed another firm of accountants. The report by this firm contained no serious criticisms of the department. The Council committee has not yet reported.

Some discussion has been raised upon the apparent fact that the net earnings of the company for the year 1904 failed to make the customary increase. In a letter to the accountant, dated November 2, 1905, Superintendent Bemis explains this apparent falling off in the following manner: Increase in 1904 of unpaid bills of $26,462.25; of operating expenses over the previous year, $32,918.46, accounted for as follows:

$7,300	advance supply of coal not used in the year,
5,000	investigating purity of water,
7,000	complaint department,
2,000	drafting properly chargeable to construction,
2,500	increased salaries.

The balance of $9,000, by an increase of business chiefly.

The only State audit that has been made under the act of 1902 was made by State Examiners W. F. Huntsman and W. T. Baker for the year 1903. Under date of May 26, 1904, they make the following recommendations: That guarantee deposits be kept as a separate account, and not included in the regular receipts and expenditures; that repairs to buildings be shown separately from repairs to pipes; that repairs, betterments, and supplies used for this department at the City Hall be shown entirely separate from the same class of expenditures on account of water works buildings proper, and that more care be taken in separating ordinary and extraordinary expenditures.

Syracuse. Sentiment uniformly favorable to the form of ownership. Everything in Syracuse is managed on political lines. The Republicans have been in power for about five years. The party leaders control the Republican papers. The *Telegram,* the personal organ of the last Democratic Mayor, McGuire, who held the office for three terms, until the beginning of 1902, died last December. There is now no Democratic paper in Syracuse. The *Journal,* the only opposition paper, seems to have comparatively little influence against so strong a political organization. The *Journal,* however, makes no objections to public ownership. The *Herald* calls itself an independent paper, but the relations of the present city administration to the present and past staff of the *Herald* make this paper in essence an administration organ.

Indianapolis. Public sentiment fairly favorable to the company. The newspapers, except the *News,* friendly. The hostility of the *News,* a really powerful organ, appears to rest on political or personal grounds, and to have but little real relation to the character of the water company, or the service rendered by it.

New Haven. The company answers "apparently favorable." This company has for many years exercised a pronounced influence by conscious efforts in making public opinion favorable. In fact, the company's influence in this field may be said to be dominant.

A 12. State current objections to present system.

Chicago. Answered under A 11.

Cleveland, Syracuse. ———.

Indianapolis. There seems to be considerable feeling that more stringent measures should be taken to prevent the pollution of the sources of supply by sewage and other means. The White River basin (1,700 sq. mi.) contains above the mouth of the creek four incorporated towns, with a combined population (1900) of 46,392, besides numerous hamlets and farms. These towns are situated from eight to fifty-four miles from the intake. It is estimated that 12,000 of the population are connected with sewers on the water shed. The secondary or emergency source, Fall Creek, drains about 300 square miles; has no incorporated towns or villages, but a thick farming population. The intake from both these sources is well within the city limits of Indianapolis (more than two miles).

The Fire Department objects to the large number of Holly hydrants, on the ground that they do not furnish an adequate supply of water. This is said to be due to the fact that the hydrants are served by three and four inch service pipes.

New Haven. The current objections center largely about the contract with the city (1902) and the feeling, still current, that the contract is not only unfair to the city, but that it was obtained by improper and unfair means.

A 13. Do the citizens take an active interest in the management of the plant?

Chicago. In a city so large as Chicago, the citizens generally take no interest, or but little interest, until somebody works up a great agitation on the subject. Other matters of such pressing importance have been kept before the public so constantly that there has been no general discussion of the water problem for many years.

Cleveland. Citizens pay but little attention to the Water Department as such. The political fever runs high in Cleveland, and the supporters of the present administration take more or less interest in the administration as a whole, and the opponents subject it to some criticism.

Syracuse, Indianapolis and *New Haven.* No.

A 14. Have there ever been competing water companies in this city?

Chicago. Largely answered under A 5. If there was ever actual competition in selling water, it was for a few months only in 1854. The territory of Rogers Park, annexed to the City of Chicago April 4, 1893, is supplied entirely by a private company, The Rogers Park Water Company, which claims an exclusive franchise for thirty years from November 12, 1888. This point is now in litigation.

Cleveland. No.

Syracuse. Never in actual operation. A competing company, The Central City Water Company, obtained an ordinance March 23, 1885, but never operated under it.

Indianapolis. There never has been actual competition. Indianapolis came into, and still operates a small municipal plant in the territory of Brightwood, annexed to Indianapolis in 1897. This plant serves entirely this annexed territory, the Indianapolis Water Company never having entered it. This small municipal plant has made no pipe extensions since the annexation, and is operated by the city at a loss of $4,846.10, from which should be deducted a credit of $1,852.50 for fire hydrants. For the six years since the annexation, allowing full credit for the fire hydrants, the loss on operation has been $5,066.48. In addition to this the city has paid a total of $5,740 in interest, and $8,000 of the principal of the debt for constructing these works. There is $10,000 in amount of the old debt still outstanding (at 6 per cent.).

New Haven. Yes. The Fair Haven Water Company was chartered by special act of July 2, 1861; with permission to lay pipes through, but not to furnish water in New Haven by special act of July 26, 1867, but it might furnish water in New Haven by an affirmative popular vote of the citizens. On September 2, 1867, the city voted to permit the Fair Haven company to supply water in New Haven by a vote of 2,978 to 116. Soon after that, probably within a year, this company was actually supplying water in New Haven, and continued to compete with the New Haven company until that company, on June 26, 1876, bought all of the stock of the Fair Haven company, giving their own stock in exchange, at par, for the $200,000 capital stock of the Fair Haven company, and assuming the bonded debt of the Fair Haven company, $125,000, at par value. Under special authority of the Legislature (Act of 1895), the Fair Haven company was legally consolidated with the New Haven company in 1896.

A 15. Are there competing companies now?

Chicago. Answered under A 14.

Cleveland, Syracuse, Indianapolis and *New Haven.* No.

A 16. If private companies have consolidated, give dates and methods briefly.

Chicago. No consolidations. From time to time the city has annexed territory with public water works. These are all operated now, so far as they have not been abandoned, by the Water Bureau of the Public Works Department of the City of Chicago. The Rogers Park Water Company referred to above is the only private company operating in the City of Chicago, and the only one in the history of Chicago operating in a territory annexed to the city at the date of annexation, except the Chicago Suburban Water and Light Company operating in Austin at the time of annexation, April 4, 1899. The part of this plant within the limits of Chicago was purchased by the city under ordinance of July 19, 1905, for $250,000.

Each of the three large park districts in Chicago, being a separate municipal corporation, has its own pumping works for park purposes. These park pumping stations, however, are inadequate. The surplus water needed is furnished by the city works free of charge. The aggregate of free water furnished the parks in the last five years (1901 to 1905 inclusive) is 3,178,616,000 gallons (manuscript report of the City Engineer to the Comptroller, 1906).

Cleveland. No consolidations.

Syracuse. None so far as known. I was unable to find what became of the Central City Water Company.

Indianapolis. No consolidations.

New Haven. See answer to A 14. In 1900 the New Haven company bought all but sixteen shares of the stock of the West Haven company. The purchase price was par to the stockholders, and a bonus, the amount of which I have been unable to determine, to the man who held an option on the shares. The New Haven company has since operated the West Haven company, paying the interest on the debt of that company, but declaring no dividends on the stock. August 1, 1906, the West Haven Company owed the New Haven company for water $22,828.45, for work and materials on the pumping and distributing system $24,533.66. Before the purchase of the West Haven company the town of West Haven had asked the New Haven company to lay its pipes in West Haven, which it had a legal right to do, on the ground that the West Haven company furnished water under a head of but 60 feet, and for other reasons. The New Haven company now sells water in bulk at four cents per thousand gallons to the West Haven company, and delivers it under a head of 130 feet. (The above statement is given by Mr. Eli Whitney, president of the two companies.)

A 17. If the present company is a subsidiary or a leased company,
(a) Give name and address of controlling company,
or (b) Lessor,
and (c) Date such control began,
or (d) Date of lease.

The question does not apply to any of the companies or plants.

A 18. Population of the city at last national census.

A 19. Estimated population Jan. 1, 1906.

A 20. Source of such estimate.

	U. S. Census, 1900.	*Estimate.*		*Source of Estimate.*
Chicago	1,698,575	1905,	2,273,000	City directory; said to be based on the census and accepted rate of increase.
Cleveland	381,768	June, '05,	442,314	U. S. Census, with estimated per cent. of increase, plus population of Glenville, annexed.
Syracuse	108,374	1905,	117,503	State enumeration.
Indianapolis	169,164	1905,	212,198	Board of Health estimate.
New Haven.......	108,027	Jan. 1, '06,	120,000	City directory.

B—SUPERVISION OF MUNICIPALITIES.

Inquiries B 1-40 to not apply to private plants.

B 1. Does the municipality have power

(a) To construct its own water plant when there is no private competing plant?

Chicago. Yes, by General Cities and Village Act of Apr. 10, 1872, Ch. 24, Sec. 176.

Cleveland. Yes. Municipal Code, 1902, Sec. 7, Par. 15, gives power to provide for a supply of water by constructing and maintaining all the necessary works and apparatus, "and to apply moneys received as charges for water to the maintenance, construction, enlargement and extension of the works, and to the extinguishment of any indebtedness created therefor."

Syracuse. Yes.

B 1. (b) To construct its own water plant without purchasing existing private plant?

Chicago. Yes; same reference as above, B 1 (a).

Cleveland. This problem is not settled by any specific language of statute, and so far as I can find out, has never been presented to an Ohio court for determination. In view of the fact that by Sec. 7, Par. 15 of the Municipal Code, the power of the city to establish its own works is given in the broadest possible language, and no specific reference is made to the possible existence of private works, and in view of the phraseology of the revised statutes, Sec. 3,551, on the introduction of competing private companies, a thing permitted with the approval only of a popular vote, and in view of the further fact that the constitution of the State (1851), Art. 1, Sec. 2, provides that no special privileges or immunities shall ever be granted that may not be altered, revoked, or repealed by the General Assembly; it would appear to me to follow by implication that an affirmative answer should be given to this question. The Ohio courts have uniformly ruled in favor of competition, and against the legality of granting an exclusive privilege to a private company.

Syracuse. Yes. Syracuse Water Company *vs.* City of Syracuse, Court of Appeals, Sickles, 71; 116 N. Y. Reports, 167.

B 1. (c) To condemn private plants under the right of eminent domain?

Chicago. Apparently not. There are elaborate provisions for acquiring works by other modes. (General Act of June 19, 1893.) Beyond question it is within the power of the Legislature to provide for condemning the franchises and property of private companies, as Sec. 14 of Art. 11 of the Constitution of 1870 declares that this particular power shall not be taken from the General Assembly, and reserves the right of jury trial in all cases of condemnation in which a private corporation may be concerned on either side.

Cleveland. Apparently not; on the ground that such plants are already devoted to a public use. Municipal Code, Sec. 10, Par. 11; and the Railroad Company vs. Dayton, 23 Ohio S., 510; also Railroad Company vs. Belle Center, 48 O. S., 273.

Syracuse. Yes. Act of 1889; Ch. 291.

B 1. (d) To purchase private plant?

Chicago. Yes. See answer to B 1 (c).

Cleveland. Yes. Municipal Code, Sec. 7, Par. 15; also Sec. 100, Par. 11.

Syracuse. Yes.

B 1. (e) To operate the plant when constructed or acquired?

Yes, for all three cities. For *Cleveland*, Municipal Code, Sec. 7, also Sec. 141.

B 1. (f) To condemn property for additions to the plant?

Chicago. Yes, within or without the city.

Cleveland. Yes; Municipal Code, Sec. 9, and Sec. 10, Par. 11.

Syracuse. Yes.

B 2. How was power conferred? by (a) general law applicable to all cities of the State? or (b) by general law applicable to all cities in a class? or (c) by special act applicable to this city alone? or (d) by administrative order? or (e) by other methods?

Chicago. General law, Statutes of 1872, Chapter 24, Section 176; Act of June 19, 1893.

Cleveland. General Law of 1902, as under B 1 (a).

Syracuse. Both by general law and by special act. Power granted to *cities of the second class* (includes Syracuse) by Laws of 1898, Chapter 182, Section 110. Power given by special act of 1889, Chapter 291, as amended by Acts of 1890, Chapter 314.

B 3. Does the city have power for the construction and acquisition of waterworks: to raise money by (*a*) taxation, (*b*) by the sale of bonds, (*c*) other methods?

Chicago. May raise money both by taxation and by the sale of bonds for such purposes, and under an Act of April 19, 1899, as amended by the General Act of May 18, 1905, cities may purchase, construct and enlarge waterworks, and pay for the same by an issue of bonds to be paid solely with the revenue of such works and a special tax levied annually during the life of the bonds. Such annual tax may not exceed 1 per cent. of the value of the property. Such purchase or construction can be made only by popular vote, with three-fourths majority, after the contract ordinance for this purpose, with a favorable recommendation by the City Engineer, has been passed by the Council and advertised thereafter for three weeks. The ballot at the election must set forth the character of the contract, the amount of the annual tax, and the number of years it is to be levied. A portion of the bonds must be paid each year, and the rates for private use must be fixed from time to time by the Council high enough, together with the annual tax, to meet the operating expenses and the principal and interest on the bonds. Two or more adjoining municipalities may acquire or construct joint waterworks under this act. By an act of April 22, 1899, cities may purchase, construct or extend a water system by certificates payable only from a water fund created by this act. This may be done by passing a tentative ordinance setting forth the character of the works and referring to the plans and specifications, which must be open to public inspection. Such an ordinance must fix the rates for water for private use, said rates to remain unchanged while the certificates are outstanding. Such an ordinance must be advertised for twenty-one days. City Council may then put ordinance in operation unless within the twenty-one days 20 per cent. of the legal voters, by petition, ask to have the matter submitted to popular vote, in which case a special election shall be called; if the ordinance is endorsed by a majority of the votes cast at the election it becomes binding. If the ordinance is not carried no further action can be taken for six months. Proceeds from such waterworks must be kept in a special fund for operating expenses and the payment of certificates so long as certificates are outstanding. In case of default on certificates both principal and interest of all certificates become due, and the works may be temporarily sold to the person offering to satisfy the foreclosure decree for the use of the works for the shortest number of years, not exceeding fifty; a decree of the court to fix the prices of water for public use; the rates of water for private use to be those of the original ordinance. The purchaser of the works is to have full use of the works with all their income during the stipulated period, and is not to make extensions save upon the terms authorized by the municipality. At the end of the period he is to turn the works back to the city in as good condition as he received them, "ordinary wear and tear excepted." It is an undecided question of burning interest, in view of the street-car situation in Chicago, whether or not such certificates are debts of the city in the sense in which the term is used in the debt limitation of 5 per cent. in the constitution, and in view of the constitutional requirements that the creation of any debt by a municipality shall be preceded by or accompanied by an annual tax sufficient to meet the interest and principal of such debts as they fall due. It is also questioned whether or not such certificates are legal in the light of the city tax limitation of 2 per cent. under the Act of April 10, 1872, which limitation is supposed to be still in force. It may also be questioned whether the provision that these certificates shall run not to exceed thirty years does not violate the provision of the Constitution, Article 9, Section 12, that no debt shall run for more than twenty years.

Cleveland. Cleveland may construct or acquire waterworks either by taxation or by bonds. Section 52 of the Municipal Code defines the taxing power in such cases. The theory of the law is that the works shall be built from the proceeds of bonds, and that when once in operation the receipts from the works will carry the debt and pay the operating expenses. By Section 2429, Revised Statutes, cities are authorized to levy a tax of sufficient amount each year to pay the interest on water loans during the period of construction. Borrowing power for this purpose is conferred by the Municipal Code, Section 100, Paragraph 11.

Syracuse. The power to tax for this purpose is conferred on all cities of the second class, Sections 96 and 110, Chapter 182, Laws of 1898. Special borrowing power is conferred on Syracuse for this purpose by Acts of 1889 and 1890 and amendments.

B 4. What is the limitation upon the city's taxing power for municipal waterworks?

Chicago. Water main extension tax, annual, by ordinance, not exceeding one mill on the dollar upon the certificate of the Water Department that revenues will be insufficient. Such tax may be increased to an amount not to exceed three mills on the dollar by two-thirds vote of all members of the City Legislature. By a like vote of the City Legislature a general water tax of two mills on the dollar may be laid, Act of July 1, 1883, as amended by Act of March 22, 1889, but these taxes must all come within the 2 per cent. limitation of Act of April 10, 1872. By General Act of June 19, 1893, additional powers are given to the effect that cities may buy or lease existing water works and levy taxes within the limits of the 2 per cent. general limitation, Act of 1872, but such purchase or lease, including annual rental or purchase price, must be approved by popular vote. This Act of 1893 is further amended to the effect that such ordinance, setting forth the terms of purchase or lease, shall become binding without a popular vote, provided that after its passage it be publicly advertised for twenty-one days, and no petition for submitting it to popular vote and signed by 20 per cent. of the voters be presented. If such petition be presented then the matter must be voted upon at a special election. If at the election it receives a majority vote the city proceeds to carry it out; if it fails of a majority no further action can be taken for six months, Act of April 24, 1899.

Cleveland. No limit except the general tax limit.

Syracuse. No special water tax except for the use of water. The maintaining of a water supply seems to be placed on a par with other municipal functions.

B 5. What is the limitation upon the general taxing power of the city?

Chicago. Two per cent. on the equalized assessment, General Act of April 10, 1872, Article 8, Section 112, as amended by Act of May 28, 1879. Taxes for interest and principal of bonded debt excepted. The annual appropriation ordinance furnishes a basis for extending such taxes. Apparently the Act of May 18, 1905 amended the Act of April 19, 1899, which authorizes a tax not exceeding 1 per cent. for building waterworks, "in addition to the taxes now authorized by law," and authorizes a maximum of 3 per cent., provided that 1 per cent. of this is for providing a system of waterworks. On the other hand, this is apparently nullified by the general provision in the revenue law of March 29, 1905, that the total taxes levied by all the municipalities; that is, all the tax levying bodies in Chicago, are not to exceed 5 per cent. of the assessed valuation; the assessed valuation under the law being one-fifth of the actual value. The following taxes are excluded from the 5 per cent. limitation: "State taxes, village taxes, levee taxes, school building taxes, district school taxes, high school taxes, and all other school taxes, road and bridge taxes, and also bonded indebtedness taxes in cities whose bonded indebtedness exceeds 10 per cent. of the assessed valuation of the property therein, upon which, under existing laws, taxes are required to be extended, and taxes levied pursuant to mandate or judgment of any court of record on any bonded indebtedness." It is provided, however, that in cities of over 100,000 population (which includes Chicago) all school taxes, except school building taxes, are included in the taxes to be reduced, if any reduction is necessary. The act also forbids the reduction of the city taxes below a minimum of $1.80 per $100, to which are to be added taxes for the bonded debt and a statutory school building tax of $2.50 maximum, and the taxes for library and park purposes. It is not the intention of the statute in fixing the minimum for city and county to reduce any other tax to a greater extent than it would be reduced under the rule if this minimum were not provided for city and county. With the strict limitation of the city tax rate, for decades, as the needs of the public service grew, the Legislature created new municipalities to perform public functions within the city of Chicago, and gave each a statutory maximum tax rate. There are ten separate taxing bodies wholly within the city and seven more partly within the city (Merriam, Municipal Revenues of Chicago, p. 69). Under this system, in the attempt to keep down taxes, undervaluation became a greater and greater scandal, so that by 1895 the assessed valuation, which constitutionally must be the true value, was estimated to be for real estate 10 per cent. of the real value (land 8 1-3, improvements 16.8) with no basis for estimating undervaluation of personal property.

The Legislature attempted by the Act of 1898 to remedy undervaluation by making the assessed valuation one-fifth of the real value, and limiting the aggregate tax rate for all taxing bodies to 5 per cent. of the assessed valuation, equal to 1 per cent. of the actual value. Certain specified taxes referred to elsewhere were to be in addition to the 5 per cent., the clear intent of the Legislature being that no individual piece of property in Chicago should, in any one year, pay more in taxes than 5 per cent. of the assessed valuation in addition to the specifically exempted taxes. The County Clerk, who extends the taxes, receives the amount certified by all taxing bodies and taking the taxes in that district in which the heaviest rates are asked (for instance, the park taxes are very much heavier in the West Town than elsewhere), then excluding all the especially exempted taxes, he reduces pro rata the percentage for each of the taxing bodies sufficiently to bring the aggregate within the 5 per cent. limit. The rate, as so determined, being that for the heaviest taxed district, in order to conform to the constitutional requirement for uniformity, must be the same in all districts for each of the taxing bodies. This means that the rate in the heaviest taxed district, being 5 per cent. of the total, may be less than 5 per cent. in one of the districts. It perhaps goes without saying that the County Clerk, before thus scaling the taxes, sees that the certified tax for each taxing body does not exceed the statutory maximum for that body. In the first years after the scaling process was legalized the aggregate certified on property in the West Town, apart from excluded taxes, amounted to about 7½ per cent. of the assessed valuation, which meant a scaling of about one-third. This badly crippled three of the most important taxing bodies, namely, the City, the County and the Sanitary District, making their respective rates (1904) $1.58 1-10, 53c. and 33c., in each case much below the respective statutory maximums. The result was that the County Clerk, without shadow of legal authority, extended an extra rate for the Sanitary District. (See C. H. Fyffe, cited in Merriam, Municipal Revenues of Chicago, pages 88 and 89.) The Legislature, by Act of March 29, 1905, fixed the minimums for the city of $1.80 (school building taxes, taxes for bond interest and court judgment in addition thereto), and for the county of 65c., and provided that the establishment of such minima should not cause any extra reduction for the other taxes; that is, the city and county taxes, with the exceptions noted, are first scaled at the same rate as all others; then a sufficient amount is added to the respective taxes for city and county to bring them up to the respective minima of $1.80 and 65c. Under this provision, these additions necessarily apply to all property subject to the respective rates for city and county purposes, and carry the 5 per cent. rate in the heaviest taxed district to a figure above 5 per cent., equal in amount to the additions made to these respective rates for city and county necessary to bring them to the respective minima of $1.80 and 65c.

Cleveland. Municipal Code, Section 23, ten mills on the dollar of the taxable property, exclusive of the levy for county and

State purposes, schools and school-house purposes, free public libraries, library buildings, university, observatory and hospital purposes, sinking fund and interest. Pension funds for firemen, police and sanitary police are also in addition to the limit of ten mills. By the Municipal Code, Section 34, additional taxes (without any limit) may be levied if approved by two-thirds public vote upon an ordinance of the Council. By the Act of April 4, 1906, a tax in addition to all other taxes authorized, sufficient to meet the annual interest and to provide a sinking fund large enough to meet the principal when due of all bonds issued under the Longworth Bond Act of April 29, 1902, was authorized.

Syracuse. Limit of 2 per cent. of assessed valuation for cities of more than 100,000 population, apart from the amount necessary to meet the principal and interest of debt. Constitution, Article 8, Sec. 10.

B 6. What is the limitation upon the city's power to incur debt for municipal waterworks?

Chicago. No special provision for waterworks, but the debt for any and all purposes is limited by the Constitution (1870, Article 9, Section 12, as amended 1904. See answer to question B 7.)

Cleveland. No separate limitation for waterworks.

Syracuse. Under the special legislative Acts of 1888 and 1889 and amendments, $4,100,000. It would appear that Syracuse might avail itself of the provisions of the legislation for cities of the second class (Laws of 1898, Chapter 182, and amendments), especially the Acts of 1899, Chapter 581, Section 26, which apparently removes all debt limit within the constitutional maximum (Constitution, Article 8, Section 10), but requires that the ordinance for any bonded debt be approved by at least four members of the Board of Apportionment, and further requires that every funded debt shall be limited to twenty years and the principal paid in twenty annual installments, and expressly forbids that any portion of such debt, principal or interest, shall be refunded. This refunding provision does not apply to improvement bonds for work done by special assessment (Laws of 1904, Section 684, Paragraph 29).

B 7. What is the limitation upon the general power of the city to incur debt?

Chicago. The constitutional limitation is 5 per cent. of the assessed valuation. No debt shall be created without provision before or at the same time for levying an annual tax sufficient to meet the interest and provide a sinking fund sufficient to pay the principal within twenty years. This debt limitation was modified by an amendment to the Constitution relating to Chicago only, and adopted at the general election of 1904. This amendment authorizes a consolidation of all taxing bodies in Chicago, and permits local special legislation, with a debt limitation of 5 per cent. on actual value, existing debts to be included within the 5 per cent. Apparently the amendment abolishes any tax limit also. All legislation under the amendment is subject to referendum, and must be approved by a majority of those voting on the question. This amendment has been upheld by the State Supreme Court, but no legislation has yet been passed under it so far as matters touched upon by the schedule are concerned.

Cleveland. Under the Longworth Act, April 29, 1902, Revised Statutes, Section 2,835, Paragraph 27, not to exceed 1 per cent. to be created in any one year except by a two-thirds vote of the Council, approved by a popular vote at a general or special election, but the total indebtedness for all purposes is not to exceed 4 per cent. of the assessed valuation, except the excess be approved by popular vote, while an ultimate limit of 8 per cent. is fixed by this act, Revised Statutes, Section 2,837. In the case of the City of Tiffin vs. Wellington J. Griffin and W. Scott Wagner, decided toward the end of April, 1906, by the Supreme Court of Ohio, all foregoing limitations are made to apply only to indebtedness created under the so-called "Longworth Act" of April 29, 1902. Previous indebtedness is, by this decision, outside of and in addition to these limitations. It appears that under the previous legislation, Act of June 12, 1879, and amendments thereto, there was no debt limitation on cities save such as might be deduced from the limitation on the levying of taxes, and such is the fact to-day in the sense that the limitation (Act of 1902) has no reference whatever to previously created debt. By amendment of April 4, 1906, cities may issue bonds for such time and in such manner as they please, not exceeding the rate of 6 per cent. Such loans within any one year shall not exceed 1 per cent., except the City Council shall, by a two-thirds vote, to be approved by popular vote, authorize larger loans, but the total indebtedness issued under this act at any time shall not exceed 4 per cent., unless the further loans are authorized by popular vote. Excluded from this is the amount held in the sinking fund to meet loans under this act. The debt shall not be considered created when the work is to be done by or through officers of the municipality until the bonds are issued and sold. Limitations of 1 per cent. and 4 per cent. shall not be construed as affecting bonds issued upon the approval of the electors of the corporation, nor bonds to be paid for by special assessment, nor bonds issued for improving and extending waterworks "when the income from such waterworks is sufficient to cover the cost of all operating expenses, interest charges, and to pass a sufficient amount to a sinking fund to retire such bonds when they become due," nor any bonds issued prior to the Act of 1892; that is, the Longworth Bond Act.

Syracuse. By Article 8, Paragraph 10 of the Constitution, the debt of any city is limited to 10 per cent. of the assessed valuation of its real estate, including the debt previously incurred. No city whose present debt exceeds 10 per cent. of the assessed value of the real estate shall incur further debt until the existing debt is reduced. This section does not forbid the issue of revenue bonds in anticipation of taxes payable out of the taxes of the year in which they are issued, or the issue of bonds for the supply of water, but the term of water bonds shall not be more than twenty years, and the issue must be accompanied by a provision for a sinking fund which must provide annually a sum sufficient to meet the principal and interest as they become due. Bonds in anticipation of revenues, if not paid within five years, come under the provisions of this article, and water bonds, although issued in excess of the 10 per cent. limit, are reckoned as a part of the debt, preventing an issue of bonds for any other purpose than the water supply.

B 8. State fully, step by step, the procedure which must be followed and the requirements which must be met before the city may acquire or construct a plant. Also the source of each provision, whether State Constitution, statute or ordinance. Note particularly the requirements as to initiation of proposal, special action by the city authorities before its adoption, mayoralty veto, referendum, publicity, making of appropriations, bond issues, and approval of schemes by court or State authorities.

Chicago. The provisions for purchasing or leasing works are somewhat different from those for constructing works. Under Chapter 24, Section 176, General Act of April 10, 1872, the city has the right to provide and establish a system of waterworks. It may take private property for this purpose by purchase or condemnation under the provision of the law providing for the taking of land by the right of eminent domain. Under the Constitution of 1870, Article 2, Section 13, the compensation for property taken or damaged must be determined by a jury. The city may use the general borrowing power conferred upon it within the limitation fixed for general purposes to establish waterworks. Under the same sections private property may be taken within or without the city limits, and the jurisdiction of the city to prevent pollution extends as far as the waterworks do. Under the General Act of April 15, 1873, the city may provide for a system of waterworks or may unite with an adjacent city, incorporated town or village, for a common system of waterworks, or may procure water from the waterworks in an adjoining city; but all contracts for the erection or construction of such works must be let to the lowest responsible bidder upon three weeks' public notice, and no member of the City Council or the Mayor shall be directly or indirectly interested in such a contract. The Council has the right to reject any and all bids. The above provision is that of the Act of April 15, 1873, as amended by the Act of May 14, 1879. Within the constitutional limitation upon debt and the limitation in the general statute of 1872 on taxes, the city may levy a tax and borrow money for waterworks purposes. (Hereafter all references to statutes are to Starr & Curtis's annotated Illinois Statutes, second edition, 1896, and supplements of 1902 and 1903.) S. & C., Par. 444, Chapter 24, gives the city jurisdiction to prevent the pollution of water for a distance of ten miles beyond the city limits. By Sec. 446, Chap. 44, the construction of all reservoirs and hydrants for fire protection and the laying of water mains may be done by special assessment under the general laws regulating special assessments. Under the General Act of May 27, 1881 (S. & C., Par. 453, Chap. 24), the city, by vote of the Council, may enlarge or change the water sources and go further from the city for that purpose, or make wells, or either, or lease water privileges, developed or undeveloped, from private parties. Expenditure under this act must be made from surplus earnings and by popular vote at a general or special election. Par. 456, S. & C., Chap. 24, authorizes a general tax not to exceed one mill on the dollar for water pipe extension to be levied by the legislative authority of the city. This must be done on the certificate of the Department of Public Works or other authority having the matter in charge, setting forth that the revenues are insufficient for the purpose, provided that by a two-thirds vote of the Council this tax may be increased to three mills on the dollar in addition to all other taxes. By the same section and by a two-thirds vote of the Council, a tax of two mills on the dollar may be laid for supplying water. All the taxes of this section are subject to the general tax limitation in Section 1, Article 8, Act of April 10, 1872, as amended by Act of May 28, 1899. By Act of June 19, 1893, S. & C., Par. 459, Chapter 24, a city may purchase or lease existing waterworks from the owner and levy taxes and issue bonds for this purpose within the general tax and debt limit; but such lease or purchase, together with the annual rental or purchase price, must be submitted to popular vote and approved by a majority vote. By Section 1847, Municipal Code of Chicago (1905), the Public Works Department is prohibited from making any contract or purchasing any supplies until authorized to do so by the City Council, and contracts for making any public improvement, if the expense be more than $500, shall be let to the lowest responsible bidder and approved by the Mayor, and must be publicly advertised before they are let, but "any such contract may be entered into by the said Commissioner (Public Works) without advertising for bids and without such approval (of the Mayor) by a vote of two-thirds of all Aldermen elected." Under Section 1848 of the Municipal Code (1905), the bids must be sealed bids and be accompanied by a deposit not to exceed 5 per cent. of the estimated cost nor less than the sum of $100. The city reserves the right to reject all bids. If the bids are rejected the advertisement for new bids "may be at the discretion of said Commissioner for three instead of five days as required in the first instance." Under Section 1849 of the Municipal Code the Commissioner of Public Works lets all contracts for the Department, and a copy thereof must be deposited with the Comptroller. Under Section 1850 the Commissioner is the judge of the performance of the work, with the right to suspend the work and to order partial or complete reconstruction, to declare the contract forfeited and to relet same without further advertisement. He may order partial payments as the work progresses, reserving 15 per cent. of the contract price of the work done at the time. By Section 1851 of the Code, contracts to be paid for out of the water fund shall so specify. By Section 1858, neither the Commissioner nor any other person in his department shall be interested directly or indirectly in any contract made by the Department, under penalty of dismissal from office and annulling of the contract at the option of the city. By S. & C., Chapter 24, Par. 42, Section 13 of Article 3, all ordinances and all propositions to create liability against the city or for an appropriation for the expenditure of money, require a yea and nay vote in the City Council. All other propositions do at the request of any one member. All such motions must be carried by a majority of all members elected, while the vote to sell any city or school property must be two-thirds of all members elected. By Par. 43, Chapter 24, S. & C., no vote of the Council shall be reconsidered at a special meeting unless as many members are present as when the vote was passed. Under Par. 47, Chapter 24, S. & C., the Mayor has the right of veto, including the veto of items of appropriation bills. By Par. 48, Chapter 24, S. & C., the Council, by a two-thirds majority and by yea and nay vote, may pass an ordinance over the Mayor's veto. By S. & C., Par. 65, Chapter 24, all ordinances making any appropriation of money shall not take effect until ten days after being published; other ordinances take effect on their passage unless otherwise provided. By S. & C., Paragraph 90, Chapter 24, Article 7, Section 2, the annual appropriation bill must be passed in the first quarter, and include the appropriations for the year. Further appropriations must be sanctioned by a majority of the legal voters by signing a petition therefor, or at a general or special election. Paragraph 91 authorizes additional appropriations to meet emergencies arising after the general appropriation bill is passed. Paragraph 92 requires that appropriation must precede a contract imposing liability. By S. & C., Paragraph 63, Article 5, Chapter 24, the city shall have power "fifth, to borrow money on the credit of the corporation for corporate purposes, and to issue bonds therefor in such amounts and form, and on such conditions as it shall prescribe" (subject to the 5 per cent. limitation). The city must at the same time that it creates any debt provide for the collection of a direct annual tax sufficient to pay the principal and interest as they become due, the loan not to run beyond twenty years. By General Act approved May 11, 1901, on petition signed by 25 per cent. of the registered voters in any incorporated town, village, city, township, county or school district, or by 10 per cent. of the voters of the State, any question of public policy must be submitted to popular vote. Such vote under the general act has no legal force. (See also answers to questions B 3 and B 4.)

Cleveland. By the Municipal Code (1902), Section 122, and Section 1694 of the Revised Statutes, "no ordinance or resolution granting a franchise, or creating a right, or involving the expenditure of money, or the levying of any tax, or for the purchase, lease, sale or transfer of property, shall be passed unless the same shall have been read on three different days." This may be suspended by a three-fourths yea and nay vote of all members elected. All ordinances must be passed by a majority of all members elected to the Council. (Smith vs. R. R. Co., 8 N. P. 1.) By the Revised Statutes, Section 1695, ordinances shall not take effect until ten days after the first publication. They must be published in a newspaper of the place either in a weekly once or in a daily twice. By Section 1697 of the Revised Statutes, in case no newspaper is published in the place, posting for fifteen days in at least five different places designated by the Council takes the place of publication in the newspapers. By Section 125 of the Municipal Code (1902), every ordinance and resolution of the Council must be approved or is subject to the veto of the Mayor within ten days. He also has the right to veto any item of an ordinance appropriating money. The Council may pass an ordinance over the veto of the Mayor not earlier than ten days after it is reported to them, by a two-thirds vote. By Section 138 of the Municipal Code, a Department of Public Service shall be established, consisting of a board of three or five members, to be determined by ordinance, elected for terms of two years. By Section 139 of the Code, this board is declared "the chief administrative authority of the city." The board has charge of all public works and all public institutions except as in this act otherwise provided. By Section 140, the board is given charge of the construction of all public improvements and public works. By Section 141, they are given "the management of all municipal water, lighting and heating plants." By Section 143, the board may make a contract, purchase supplies and material, or provide labor for any work costing less than $500.00. When the work, apart from the compensation of the persons employed therein, is to cost more than $500.00, the expenditure must first be authorized by ordinance, and the contract, after not less than two nor more than four consecutive weeks of public advertisement in a newspaper, shall be let to the lowest and best bidder. The customary provisions for a guarantee bond, the rejecting of the bids of those entering into collusion, etc., are made. Any alterations in the contract are subject to almost as severe regulations. The power to make such contracts cannot be delegated. (Knauss vs. Columbus, 13 Ohio Decisions (reprint) 269.) The board cannot split up a contract of more than $500.00 and let it in parts, without advertisement. (Wing vs. Cleveland, 156 Law Bulletin 60.) The board has a wide discretion in determining what is the lowest and best bid. Fraud, recklessness and improvidence must be shown to justify the interference of a Court. (Kerlin Bros. vs. Toledo, 20 C. C. 603; Irwin vs. Greenville, 1 Dayton 140.) By Section 145 of the Municipal Code, the directors of public service may employ such superintendents, inspectors, etc., and other persons "as may be necessary for the execution of the powers and duties of this department, and may establish such sub-departments of administration as they choose." By Section 129 as amended by Act of April 7, 1904, the complete right of appointing officers, agents and employees of the department is fixed in the board, which also fixes the compensation of each, and removes and suspends them at pleasure. In general, the power cannot be delegated, although it has been decided that officers of the department having a large number of men under them may suspend for insubordination or dereliction of duty until they can report to the board and the board acts. (Kelly vs. Cincinnati, 7 N. P. 360.) I understand that it is the practice of the Board of Public Service in Cleveland to employ direct labor for constructing and carrying out the works of the department, but to advertise under under the Code for material when the expense is more than $500. By Section 28 of the Code, the Council has charge of the streets, and the powers of the Public Service Board are to be strictly construed. (State vs. Boyden, 4 N. P. 322.) The directors of the Public Service Board must keep a record of their proceedings, act by majority, and must not be interested personally in their contracts. Copies of all their contracts must be deposited with the Auditor. For the right to issue bonds for water works in the Longworth Bond Act, Municipal Code Section 100, Revised Statutes, Section 2835, see answer to question B 7 of this schedule. By Section 45, no contract or agreement involving the expenditure of money shall be entered into, nor shall any ordinance, resolution or order for the expenditure of money, be passed by the Council or by any board or officer of a municipal corporation unless the Auditor, if there be one, if not, the Clerk, shall first certify to the Council that there are unappropriated funds in hand to meet the obligation. Action contrary to this provision is null and void; the officer violating the provision is disqualified from holding office, and is liable for the money expended. Contracts for furnishing water to the corporation or for leasing "the water works plant of any person, firm or company therein situated for a period not exceeding ten years," are exempt from this provision. The restrictions under this section do not apply to any contract to be paid for by funds not raised by taxation. Section 2836 of the Revised Statutes requires the city each year to levy in addition to all other taxes authorized by law a tax sufficient to meet the interest and principal of any debt created under this, the Longworth Bond Act of April 29, 1902, as they fall due respectively. By Section 2837 elaborate provisions are made for passing an ordinance declaring that a bond issue in excess of the 1 or 4 per cent. limit, as the case may be, is necessary, for the notice of election and for the form of ordinance to issue bonds after the affirmative popular vote. By Act of April 4, 1906, the city is authorized to levy an annual tax sufficient to pay the interest and provide for the payment of the principal when due of bonds issued under the Longworth Act, Section 2835 to 2837 R. S. This tax is in addition to all other taxes now authorized by law. The act places the total limitation of bonds issued under the act at 8 per cent. Section 124 of the Code provides that ordinances and resolutions required to be published shall be published in two newspapers of opposite politics, published and having a general circulation in such municipality, if such there be, and also in a German newspaper if there be one in the city of more than 1,000 copies bona fide paid circulation. Publishing in an independent paper does not meet this requirement. (Ohio State Journal vs. Brown, 19 C. C. 385.) By Section 124a of the Municipal Code, amended April 25, 1904, official publication in book form may take the place of publication required by Section 124.

Syracuse. The present plant was entirely acquired and constructed under special legislation, the history of which is perhaps sufficiently given under question B 3. Under the charter for cities of the second class, Acts of 1898, Chapter 182, with amendments, Laws of 1902, Chapter 177 and Laws of 1904, Chapter 434, it is made the duty of the Commissioner of Public Works, Section 110, "to see that the city has an abundant supply of wholesome water for public and private use; to devise plans and sources for this water supply; to plan and supervise the distribution of water through the city." He makes the rules and regulations, which must be approved by the Council; he fixes the water rents and the water rates, which must be approved by the Board of Estimate and Apportionment. By Section 109, the Commissioner has charge "of the construction, maintenance, extension and repair of the City Water Works." He is, however, forbidden to spend any money without the authority of the Council by ordinance. By Section 19, no ordinance may be passed on the same day it is introduced except by unanimous consent, and no appropriation except by ordinance in detail passed by three-fourths of all the members. (Kirk vs. McGuire, 39, Misc. R., 596.) Every ordinance must receive the approval of the Mayor (Section 21 of this act), or within thirty days after his veto be passed by the Council over his veto by three-fourths vote of all the members, and to pass over the Mayor's veto requires at least as many affirmative votes as were necessary to pass the original ordinance. By amendment of 1904, Chapter 98, it is required that all bonds issued by the city be advertised for sale by the Comptroller for at least five successive days in the official papers, and sold not earlier than ten days after the first publication. If the sale is by sealed bids, the bids must not be opened until one hour after the appointed time for the meeting for that purpose, and the sale must be to the highest bidder. The Comptroller may reject all bids, but must then readvertise. Section 96 of the General Code provides for a Board of Estimate and Apportionment, consisting of the Mayor, Comptroller, Corporation Counsel, President of the Common Council and the City Engineer, which board shall, within the first sixty days of each fiscal year, make up in detail a budget which is submitted to the Council. The Council must give a public hearing on the budget and may reduce but not increase all items except such as relate to the city debt. An Act of 1906, Chapter 214, requires the Council to add not less than 1 per cent. nor more than 3 per cent., as the Board of Apportionment shall determine, to the amount required for each purpose to cover possible deficiencies in collection. This budget, when adopted by the Council, becomes the tax levy and the appropriation bill for the year. In cities which had no sinking fund when this act went into effect (1898), 30 per cent. of the receipts of the city from other sources than taxation are to be put into a sinking fund to pay the bonded debt of the city apart from that for local improvements. The City Council is expressly prohibited from reducing any item of revenue. By the Laws of 1905, Chapter 681, Section 2, the Board of Estimate and Apportionment, before submitting the annual estimates to the Council, must give public hearings on the same. By Section 28 of the Code of 1898, all legislative acts are by ordinance, and all ordinances require a recorded yea and nay vote. By Section 120 of the Code, a Board of Control and Supply, consisting of the Mayor, the Comptroller, the Commissioner of Public Works, the Corporation Counsel and the City Engineer is created. It is the duty of this Board, after public notice in accordance with regulations to be prescribed by ordinance, to let all contracts to the lowest bidder for the performance of any work or the supply of any material for the Department of Public Works, etc., in all cases where the work and materials will cost more than $50.00, unless by the unanimous vote of the Council and also by the unanimous vote of the Board of Estimate and Apportionment the contract method is declared impracticable. Emergency repairs are excepted from this under strict limitations. The Board has the right to reject all bids. By the Acts of 1899, Chapter 581, a contract made for the expenditure of money in excess of the appropriation is declared null and void, and any officer making such a contract is liable to fine and imprisonment. Section 121 prohibits the letting of any contract except by bids and the receiving of bids at irregular periods. By Section 122, the presence of all members of the Board at the meeting for receiving of bids is required at the time designated in the notice. By Section 120, the bids must not be opened for one hour after that time, and must be opened in the presence of newspaper reporters and the bidders, but may be opened without the presence of all members of the Board. In case all bids are rejected, they must be readvertised. About a decade ago (Eighth annual report Syracuse Water Board, p. 42), the Water Department ceased making extensions of mains by contract, and has since bought the material for such extensions by public contract, and laid the mains by labor employed directly by the Department. I believe there was no legal authority for such a change at the time it was made. It certainly is prohibited by the newer legislation cited above.

B 9. If the municipality is required to pay taxes or fees in regard to its plant to other governmental authorities, explain system.

Chicago. No such payments.

Cleveland. No such payments. Property used for public purposes is in Ohio exempt from taxes. (Cincinnati vs. Lewis, Auditor, 66 O. S. 49.)

Syracuse. Pays the ordinary property taxes on the parts of its system and property lying outside of the City of Syracuse.

B 10. Give statutory provisions regarding purchase of private plants by the city.

Chicago. By act of June 19, 1893, Starr & Curtis, Paragraph 450, Chapter 24, the city may purchase or lease existing water works from the owner, and levy taxes, and issue bonds for this purpose within the general tax and debt limit, but such lease or purchase, together with the annual rental, or purchase price, must be submitted to popular vote, and approved by majority vote.

Cleveland. The provisions touching this point found in the municipal code, Section 7, Paragraph 15, and Section 45, are very general. By Section 7, Paragraph 15, the city is authorized to provide for a supply of water by constructing and maintaining water works, and to acquire by purchase, lease or otherwise, the necessary lands for such purposes within or without the municipality. By Section 45, the city is permitted to contract with any person, firm or company for furnishing water to such corporation, or for the leasing of the water works plant for a period not exceeding ten years. The city, under this clause, is released from the provision that the money for this purpose must be certified to be in the treasury. Section 100 of the code authorizing loans, Paragraph 11, specially authorizes loans "for erecting or purchasing water works and supplying water to the township, hamlet, or corporation, and the inhabitants thereof." Section 7, Paragraph 15, authorizes the city to apply the receipts from water works to the maintenance, construction, enlargement and extension of the works.

Syracuse. The city purchased the plant of the Syracuse company under special legislative authority, acts of 1889 and 1890. These acts are still in force, and would permit the city to make purchases of any other plants in operation there. Under the general code for cities of the second class (1898), and amendments thereto, the city would have the right to purchase at voluntary sale.

B 11. Give statutory provisions regarding condemnation of private plants by the city under the power of eminent domain.

Chicago. Apparently there is no right of condemnation of private plants, in view of the fact that the city has the right, as previously explained, of construction and operation of competing works, and in view of the elaborate provision for the city to buy or lease private works by voluntary contract. (See also the answer to B 8, and Starr & Curtis, Chapter 24, Paragraph 450; Act of June 19, 1893.) However, there can be no doubt of the power of the legislature to authorize such condemnation at its discretion. The Constitution, Article 11, Section 14, provides that "The exercise of the power and the right of eminent domain shall never be so construed or abridged as to prevent the taking by the General Assembly of the property and franchises of incorporated companies already organized, and subjecting them to the public necessity, the same as of individuals." The right of trial by jury is guaranteed when an incorporated company is interested in condemnation cases on either side.

Cleveland. It seems to be well established law in Ohio, that property once devoted to public use, cannot be condemned by a municipality for another public use, provided that such condemnation destroys the first public use, or renders those in charge of the first public use incapable of performing their public duties. Under this principle it is impossible for the city to condemn the property, rights and franchises of a private water company. There can be no doubt that the Legislature has the power to authorize the city to condemn rights, property and franchises of private water companies, but it has not yet chosen to do so. Section 9 of the municipal code authorizes the city to appropriate property for public purposes. Such purposes are largely enumerated, among which are (Section 10, Paragraph 11) water works. Under Section 12 the order of procedure is declared to be as follows: Resolution declaring intent, defining purpose, and describing property to be appropriated, for which but one reading is necessary; second, notices to owners, personally served, or notice published once each week for five successive weeks, if owners or agents cannot be found; third, ordinance to appropriate, which must direct the solicitor to apply to the proper court to assess compensation. This requires a two-thirds vote of the Council. Fourth, application to assess compensation; fifth, notice of application, and time and place of same, served as other legal process, or if service cannot be had, then by three weeks' publication, once a week; sixth, time set for trial by jury to assess compensation; seventh, jury summoned, trial, verdict, and judgment entry. The forms for the various steps are prescribed by the statute. Section 21 gives the right of appeal as in other civil actions, but the city, upon paying or depositing the amount of the judgment, and giving adequate security for further compensation and costs, may take possession of the property. By Section 22, the failure of the city to pay or take possession within six months renders the proceedings void. The six months runs from the entry of the order directing the assessment to be paid. (Ryan vs. Hoffman, 26 O. S., 109.)

Syracuse. There is no such right under the general legislation, but it is clearly within the power of the Legislature to grant such right. Under the special legislation of 1889 and 1890, Syracuse was given such right so far as regarded the property of the Syracuse Water Company.

B 12. Give statutory provisions regarding area which may be served by municipal plant.

Chicago. Within the city limits (General City and Village Act, April 10, 1872, Starr & Curtis, Chapter 24, Paragraph 175, Article 10), save as modified by the act of April 15, 1873, as amended by the act of May 14, 1879, authorizing adjacent cities or towns to construct and maintain one system of water works for joint use. On April 4, 1893, Rogers Park was annexed to Chicago. The private water company (the Rogers Park Water Company) claims an exclusive contract privilege for that territory for thirty years from November 12, 1888. The City of Chicago has recently ordered water pipes extended from its works into that territory. The matter is now in litigation. For further explanation of the particulars of the Rogers Park controversy, see the answer to question D 25.

Cleveland. Within the limits of Cleveland and (Section 2,421, Revised Statutes) upon petition of property owners outside for a distance of four miles, the pipes in such territory to be an extension of the city pipes. By Section 2,425, any city or village owning its water works may, by contract with another city or village, furnish water to that city or village, and lay the pipes necessary therefor. By Section 2,428, the annexation of one municipality to another terminates such contract for water supply. The city of Cleveland now has contracts to furnish water to eight contiguous villages, and five associations and cemeteries outside of the city limits. In every instance, although the water is intended for both public and private use, under the contract the water is measured to the village or association, and paid for direct by the contracting party to the City of Cleveland. All piping and other apparatus is paid for by the village or association, and erected or constructed on a uniform system with that of the Cleveland Water Works, with the approval, and under the supervision of the Superintendent of the Cleveland Water Works. The usual price is from one-half mill to one mill, plus 25 per cent. per cubic foot, depending upon the amount of water used. Three of the associations—not villages—pay a uniform rate of one and two-tenths mills per foot. The price in such instances (contracts with contiguous villages), under Section 3,701, Revised Statutes, is left entirely to mutual agreement of the contracting parties. On the other hand, the city is permitted to extend its pipes outside of the city limits anywhere, to the extent of four miles, upon the petition of citizens, and private citizens may under the supervision of the Superintendent of the Water Works of the city, lay their own pipes to the city mains. The city is permitted and required in both of these instances, to furnish water to those desiring it, at a rate not exceeding by more than 10 per cent. that charged in the city. Such pipes and all apparatus therewith connected are as completely under the control of the Superintendent of Water Works, as if they were within the city limits. Such pipes laid by private citizens in case of annexation, become the property of the city, which must pay a just compensation therefor (Section 2697, Revised Statutes 1905). The City of Cleveland in every case reserves the right to discontinue the services upon thirty days' notice, without damages, except in the case of the village of Cleveland Heights, which village is to construct a reservoir and pumping station, where the city must give two years' notice to discontinue service. With the exception of the contract with Newburg Heights any village or association agreeing to take water may cancel the contract by thirty days' notice. Newburg Heights must give six months' notice to cancel its contract. In the case of the villages, provision is made by statute that, in case of annexation, the pipes become the property of the City of Cleveland. By the contracts with the associations, not villages, in case of annexation, as soon as the revenue for water from the pipes is sufficient to pay 6 per cent. on the cost, the city agrees to purchase the pipes at their cost, less just depreciation. Under contract of September 28, 1895, the city agrees to furnish water for cemetery purposes to the Lakeview Cemetery free, in consideration of a slice of land presented by the cemetery to the city for public purposes.

Syracuse. The City of Syracuse. While the point has not been judicially determined, it seems that this right is broad enough to include future annexations to the city. (Laws of 1889 and 1890.)

B 13. Give statutory provisions regarding nature of plant and equipment.

Chicago and *Cleveland.* No provisions.

Syracuse. Left entirely under both the special laws of 1889 and 1890, and the general code, cities of the second class, 1898, to the city government, except that under the present legislation, laws of 1890, the size of the conduit from Lake Skaneateles is limited to thirty inches, as explained under question A 3. This limitation was made wholly in the interests of the Erie Canal, which in 1843 appropriated the waters of this lake as a feeder for the canal.

B 14. Give statutory provisions regarding extensions, improvements and new processes.

Chicago. By act of April 15, 1873, amending the city and village act, Starr & Curtis, Chapter 24, Paragraph 442, cities have full power to construct and extend water works, provided neither the Mayor or any member of the Council be interested in the contracts, and that all contracts after three weeks' public notice be let to the lowest responsible bidder. By Paragraph 443, same chapter, the city may borrow money and levy a general tax for this purpose within the general limitations of debt and taxes, described elsewhere (debt 5 per cent., taxes 2 per cent.). By Paragraph 444, of the same act, the city may acquire property within or without the city by purchase or condemnation for this purpose. Reservoirs, hydrants and water mains for fire protection may be provided by special assessment on property benefited. By Paragraph 447, the revenues from water works must be applied; first, to the maintenance, construction and extension of the water works, and any surplus thereafter goes into the general fund. By ordinance, code of 1905, Section 1906, the Commissioner of Public Works is authorized to extend water mains, provided the owners of adjoining property will pay all of the first cost, upon condition that such owners be repaid in full as soon as the income from the use of such pipes equals $.10 per linear foot per annum. If the income does not justify such a refund within two years, the owners of the property are entitled to interest on their advance at the rate of 3½ per cent. By Section 1909 water pipes that are laid by special assessment are to be ultimately paid for by refunding the amount of special assessment, less 10 per cent., provided the permanent income from the use of such pipes amounts to 10c. per lineal foot per annum. Such refund is to be made only when and upon condition that there is money in the water fund sufficient for that purpose. By Section 1908 all extension of water mains, except such as are paid for originally by adjoining property owners, or by special assessment, must be authorized by the Council, upon the recommendation of the Commissioner of Public Works. The Council fixes the size, location and cost.

Cleveland. No provisions except the plenary ones previously referred to, authorizing the city to provide for a supply of water, and to levy and collect rates therefor, except in regard to extensions outside of the city limits. By Section 2421, Revised Statutes, such extensions may be made as much as four miles beyond the city limits upon petition of those desiring services, who must pay the expense of the extensions, which are to be made under the superintendence of the engineer of the city furnishing the water. Such city has full charge and control of pipes when laid, and maintains them at its own expense. When the territory containing such pipes is annexed to the city, the pipes become the property of the city, which must pay to those who paid for putting them down a just compensation. Section 2422, the city laying such pipes, has as full police power to protect the water from injury or pollution, and all the property connected with the works in that territory from injury, as if the same were inside the city. By Section 2423, any city may contract with an adjoining municipality to provide such municipality and the citizens thereof with water, and erect all necessary pipes and works therefor. By Section 2425 of the statutes, any city or village which has established or may hereafter establish water works may enter into contract with any contiguous city or village to sell to such city or village for the inhabitants thereof any surplus water for any purpose whatever, upon such terms as may be agreed upon by the Board of Trustees, and confirmed by the Council. Moneys received under such a contract may be used by the city for the construction and maintenance of water works. Such contracts may not exceed twenty years, nor are such contracts permitted with cities or villages not contiguous. (Wright vs. Kennedy Heights, 1 C. C. New Series, 195, and 25 C. C., 409.) By Section 2426, such contiguous village or city contracting for water may pay for the same in the same manner as it would pay for constructing and operating its own works. By Section 2428, when a contiguous city or village is annexed to the city with which it has a contract to supply it with water, such contract is thereby terminated. See also answer to question B 3 (a).

Syracuse. Left entirely to city government.

B 15. Give statutory provisions regarding the price of service, arrangement of charges, discount, deposits, etc.

Chicago. The statutes, City and Village Act, April 10, 1872, as amended, Starr & Curtis, Chapter 24, leave these matters entirely to be regulated by ordinance.

Cleveland. Under the old charter of Cleveland (Revised Statutes 1545-37), the Director of Public Works "shall have the care, management and administration of the water works, and the supply and distribution of the water, and the collection of water rents." The language of the new code (1902) is decidedly ambiguous. By Section 7, Paragraph 15, the city is given power to provide for a supply of water by constructing water works, and by Section 141, the director of public service shall have the management of all municipal water, lighting and heating plants. These two sections are supposed to take the place of earlier legislation, and to give the city, through the Department of Public Works, the power to construct, repair, extend, maintain and operate the works; to levy the necessary water rates, and to collect the same. Unfortunately the new act is very much briefer than the old, and the city is compelled to infer from the avowed intention of the Legislature to codify all the municipal law that it has all the powers given under the previous code. For instance, under the earlier legislation, there was a separate water fund. The new act contains no provision except that by Section 7, Paragraph 15, the city is empowered "to apply moneys received as charges for water to the maintenance, construction, enlargement and extension of the works, and to the extinguishment of any indebtedness created therefor." I understand that in recent years under this provision, the city has required the Water Works Department to carry its own debt. Formerly as an offset to this, the water works made a charge for the water furnished to the city departments; but this appearing to be contrary to the act of May 7, 1879, was discontinued. Under the old code the power of fixing the rates was taken from the Council, and placed in the board having charge of the works. The new code is silent on this point. The best legal opinion here is, however, that under the new code the Board of Public Service, and not the Council has the legal right to determine the rates, and all other matters referred to under this question. The old code provided that the acts of the board should have the force of ordinances when not in conflict therewith. By Section 2417, Revised Statutes (Paragraph 463, of Ellis's Municipal Code, Edition of 1903), it is provided "that no charge shall be made by the trustees or board" for extinguishing fires, fire department purposes, cleaning of market houses, or for the use of public school buildings, or for the use of any public buildings of the corporation, or for hospitals or asylums or charitable institutions. This section was held constitutional in Gallipolis vs. Trustees, 2 N. P. 161. It was held to apply to State institutions as well as municipal.

Syracuse. Code of 1898, Section 110, the Commissioner of Public Works prescribes rules and regulations for the use of water, which, when approved by the Common Council, have the effect of ordinances. With the consent of the Board of Estimate and Apportionment, he establishes water rates, or annual charges. This section authorizes water rates on lots as well as buildings. Water rates are a lien upon real estate as any other taxes are. It is the

Commissioner's duty to make out a water rate, or assessment roll by wards, upon each lot or building reached by the pipes. He must give a public hearing or hearings on the assessment. The Common Council then levies these rates, which are collected with the ordinary taxes. Such water rents can be collected from such lands and buildings only as can be served by the water pipes. By Chapter 75, laws of 1906, the levying of water taxes where there is no use of water, is separated from the fixing of water rates for the use of water, and turned over to the Board of Assessors, to whom the Commissioner of Public Works must furnish the necessary data. By Section 8 of this act, the water taxes on property within reach of the mains, and which pays nothing for the use of water, is to be $.05 per lineal foot. Special provision is made for unplatted land and corner lots, and a rebate is given where water is taken before the end of the year for which the tax is paid. This tax goes to the water fund. By the same section, the Commissioner of Public Works makes estimate in detail of the entire cost of sprinkling water and the flushing of the streets, and this cost is assessed pro rata per lineal foot on the property benefited by such works. By the rules now in force, adopted January 1, 1902, Rule 52, bills at schedule rates (unmetered water) are payable at the treasury semi-annually in advance. If schedule or semi-annual meter bills are paid before July 15 and January 15, respectively, a discount of 5 per cent. is given. If not paid within thirty days from date, the city reserves the right to turn off the water. The bureau sends bills to the consumers, but does not employ collectors. By Rule 54, bills for metered water for other than domestic use, are payable monthly. Monthly meter bills are not subject to discount; but if not paid by the 15th, 2½ per cent. is added for each fifteen days or fraction thereof, and the right is reserved to cut off the water after the fifteenth of the month. By Rule 59, water turned off for non-payment will not be turned on until all bills and fines are paid. By Rule 70, there is no abatement for a period of less than three months where water is turned off by request. No permit for new service or alteration of any existing unmetered service will be granted, except accompanied by an order for the installation of a meter.

Following will be found a statement of the water rates as they existed in 1880 under the Syracuse Waterworks Company; the rates charged by the water company in 1885, and which were continued by the Water Board after the acquisition of the plant in 1892 until 1896, and the present rates, which have been in force since 1896.

1880.

SYRACUSE WATER COMPANY.

E. W. Leavenworth, Prest.
Edward H. Brown, Sec'y and Supt.

Table of Rates.

DWELLINGS.

Front Width of Building.	Stories in Height. 1	1½	2	2½	3	4	5
Under 25...	7.50	9.00	12.00	13.50	15.00	18.00	21.00
25 to 30....	10.50	13.00	15.00	16.50	18.00	21.00	24.00
30 to 35....	13.50	16.00	18.00	19.50	21.00	24.00	27.00
35 to 40....	16.50	19.00	21.00	22.50	24.00	27.00	30.00
40 to 45....	21.00	24.00	25.50	27.00	28.50	31.50	34.50
45 to 50....	25.50	28.00	30.00	31.50	33.00	36.00	39.00

MISCELLANEOUS OR EXTRA RATES.

Bathing Tubs.	
Private Houses, one tub	$ 5.00
Each additional tub	3.00
In Hotels	$6.00 to 8.00
In Barber Shops and Bathing Houses, each	12.50
Bakeries, for each barrel of flour used daily, $5 per annum, with additional charge for steam engines.	
Barber Shops.	
1st chair	6.00
2d chair	4.00
Each after	2.00
Blacksmiths' Shops.	
One fire	10.00
Each additional	5.00
Breweries, Distilleries, Rectifiers, &c., subject to special rates, or by meter measurement.	
Building Purposes.	
Laying Stone, per perch	2c
" Brick, per thousand	6c
Plastering, 100 yards	20c
Dwellings.	
Dwellings occupied by more than one family, subject to special rates (stores in dwellings charged extra).	
Foundries, Machine Shops, Manufactories, &c., subject to special rates or meter measurement.	
Fountains.	
1/16 of an inch delivery	$12.00
⅛ " " "	25.00
¼ " " "	75.00
½ " " "	150.00
Not to run over 4 hours per day without special permission.	
Hotels, Taverns and Boarding Houses subject to special rates.	
Locomotives	65.00
Mechanics' Shops.	
Not exceeding 10 hands	$10.00
And each additional hand	1.00
Offices, from	$5.00 to 10.00
Printing Offices (engines not included), from	$10.00 to 25.00
Saloons and Eating Houses, from	$10.00 to 50.00
Stables.	
Livery, Omnibus, Horse-car, up to 20 stalls, each	2.50
Each additional stall	2.00
Stables—Hotel (special rate).	
" Private, with water for washing, &c	6.00
And for each horse over two	2.00
For cart and work horses, and cows, each	1.50

STEAM ENGINES.	
Steam Engines, per horse power, up to 25 horse power	6.00
If above that, to 100	5.00
If above 100 horse power	4.00
STORES.	
Stores other than Grocery, Provision, Liquor and Drug Stores	10.00
Drug Stores, from	$15.00 to 25.00
Grocery, Provision and Liquor, from	$10.00 to 25.00

HOSE BIBS.

Street Washers. The right to attach a hose of not more than ¾ of an inch orifice, for washing windows, sprinkling streets or gardens, or for use in stables, or any other purpose in addition to the charge for other uses, not less than $5, and the use of same shall be limited to one hour a day.

URINALS.	
Urinals in private houses, each	$ 3.00
In Stores, Banks and Offices, each	5.00
In Hotels and Boarding Houses, each	5.00
In Blocks and Saloons, each	6.00

If the flow is constant, to be charged double prices—orifices not to exceed the — part of an inch.

WATER CLOSETS.	
In Private Houses, each	$ 5.00
In Stores, Banks or Offices	5.00
In Hotels and Boarding Houses	4.00
In Blocks and Saloons	6.00

Closets supplied by ordinary faucets or draw cocks, not allowed.

METER RATES.

100	gallons	or less	daily	40c	per	1000
100	"	to	200 "	35c	"	1000
200	"	"	500 "	30c	"	1000
500	"	"	1,000 "	25c	"	1000
1,000	"	"	5,000 "	20c	"	1000
5,000	"	"	10,000 "	15c	"	1000

Above 10,000, ten cents per thousand gallons.

1885.

SYRACUSE WATER COMPANY

DWIGHT H. BRUCE, Pres't.
EDWARD H. BROWN, Sec'y and Supt.

TABLE OF RATES.

	Per annum.
DWELLINGS.	
Two stories	$10.00
All others	12.00
BATHING TUBS.	
Private houses, one tub	4.00
Each additional tub	2.00
In hotels	$5.00 to 7.00
In barber shops and bath-houses, each	$8.00 to 10.00
BAKERIES	Meter.
BARBER SHOPS.	
First chair	5.00
Each after	2.00
BLACKSMITHS' SHOPS.	
One fire	7.00
Each additional	2.00
BREWERIES	Meter.
BUILDING PURPOSES.	
Laying stone, per perch	2c
Laying brick, per thousand	5c
Plastering, 100 yards	30c

Foundries	Meter.

Fountains.

1/16 of an inch delivery	$ 8.00
1/8 “ “ “	15.00
1/4 “ “ “	50.00
1/2 “ “ “	100.00

Not to run over 4 hours a day without special permission.

Hotels and Boarding Houses.

To be rated or metered.

Mechanics' Shops.

Not exceeding 10 hands	10.00
And each additional hand	1.00

Offices, from	$5.00 to 15.00
Printing Offices (engines not included), from	$10.00 to 18.00
Saloons and Eating Houses, from	$10.00 to 40.00

Stables.

Livery, Omnibus, Horse-car, per stall	$ 2.00
Hotel, special rates.	
Private, with water for washing, etc., 1 horse	3.00
And for each horse over one	2.00
For Cart and Work Horses	1.50

Steam Engines.

Steam Engines, per horse power	$ 4.00
Stores, from	$10.00 to 20.00

Hose Bibs.

Street Washers. The right to attach a hose of not more than 5/8 of an inch orifice, for washing windows, sprinkling streets or gardens, or for use in stables, or any other purpose in addition to the charge for other uses, not less than $6.00.

When unaccompanied by inside use for domestic purposes, the charge will be $10.00.

The use of all hose is limited to one hour per day, and persons using are only allowed to sprinkle in front of their own premises and one-half of the street opposite their premises.

Urinals.

In private houses, each	$ 2.00
In stores, banks and offices, each	5.00
In hotels or boarding houses, each	5.00
Each additional	3.00
In blocks and saloons, each	$5.00 to 10.00

If the flow is constant the rate to be special.

Water Closets.

In private houses, each	$ 5.00
Each additional	3.00
In stores, banks and offices	5.00
Each additional	4.00
In hotels and boarding houses	$6.00 to 10.00
In blocks and saloons	$5.00 to 10.00

Closets supplied by ordinary faucets or drawcocks not allowed.

Meter Rates.

500 gallons or less daily			25c per 1000
500	“ to	3,000 “	20c “ 1000
3,000	“ “	5,000 “	15c “ 1000
5,000	“ “	10,000 “	10c “ 1000
10,000	“ “	20,000 “	8c “ 1000
20,000	“ “	30,000 “	7c “ 1000
30,000	“ “	50,000 “	6c “ 1000

PRESENT RATE SHEET

METER RATES

At least $5.00 per annum must be paid for each family supplied who will be allowed 3,600 cubic feet of water, any excess to be paid for at the rate made by quantity used, as per established rates shown by monthly consumption. The minimum charge for any service is $5.00 per annum.

MONTHLY METER RATES

(In cubic feet.)	Per 100
1,900 or less	14 cts.
1,900 to 2,400, inclusive, lump sum, $2.65	
2,400 to 6,000, inclusive	11 cts.
6,000 to 8,200, inclusive, lump sum, $6.60	
8,200 to 14,400, inclusive	8 cts.
14,400 to 17,700, inclusive, lump sum, $11.50	
17,700 to 21,000, inclusive	6½ cts.
21,000 to 27,300, inclusive, lump sum, $13.65	
27,300 to 40,000, inclusive	5 cts.
40,000 to 57,100, inclusive, lump sum, $20.00	
57,100 and up	3½ cts.

Water used on the following named services must be metered: Saloons, restaurants, drug stores, bakeries, dental offices with fountain jet, photograph galleries, printing offices, laundries, breweries, soda water manufacturers, etc., factories, foundries, fountains, livery stables, steam engines, motors, greenhouses, business blocks, elevators (elevator registers not allowed), fire services, barber shops with baths, urinals, mechanic shops, air pumps.

SCHEDULE RATES

DWELLINGS.	Per annum
For faucet use only, for each family	$ 5.00

The charge for each family to remain the same whether or not there is more than one faucet in the building.

For each family supplied with water from any fixture connected with the waterworks	5.00

In case of stable on premises not supplied with water from fixtures therein, an additional charge will be made for same if not supplied from well on premises. Any one who allows others to obtain water from their fixtures without authority from the Bureau of Water will be charged extra for all such use.

WATER CLOSETS	
For one in a one-family house	$ 4.00
For each additional in one-family house	1.00
For one in building occupied by two or more families, for each family	3.00
For one in store, bank or office	4.00
For each additional in store, bank or office	1.00

Water closets supplied by ordinary faucets or draw-cocks and all styles of anti-freezing closets not allowed except on metered services.

BATH TUBS	
For one or two for one-family use	$ 4.00

HOSE ATTACHMENTS.	
Accompanied by inside use	$ 6.00
When unaccompanied by inside use for domestic purposes the charge will be	10.00

The use of all hose is limited to three hours per day, and persons using are only allowed to sprinkle in front of their own premises.

PRIVATE STABLES.

For one horse, with water for washing vehicles	$ 3.00
For each additional horse	2.00
For each cart or work horse	1.50
For each cow	1.50
An additional charge for the use of water in stables when it is unaccompanied by the use of water in dwelling on premises, of	5.00

STORES.

For faucet use only	$10.00

CHURCHES AND LODGES.

For faucet use only	$10.00

FOR BUILDING PURPOSES.

For laying one cord or six perch of stone	$ .12
For plastering, 100 square yards	.20
For laying brick, per thousand	.06
For concrete, per cubic yard	.03

BARBER SHOPS.

For one chair	$ 5.00
For each additional chair	2.00

BLACKSMITH SHOPS.

For one fire	$ 7.00
For each additional fire	3.00

OFFICES.

For each office supplied with water from faucet in general use in building	$ 5.00
For faucet in office	10.00

SPECIAL RATES.

Charitable Institutions—Regular meter rates with 90 per cent. discount.

Schools, other than public schools—Flat meter rate of 3½ cents per 100 cubic feet.

Church Motors—Regular meter rates with 90 per cent. discount.

B 16. Give statutory provisions regarding character and quality of service.

Chicago. Under the city and village act of Apr. 10, 1872, as amended, Starr & Curtis, Ch. 24, this is left entirely to be regulated by ordinance.

Cleveland. I have been unable to find any reference to this matter either in the present code or in earlier legislation.

Syracuse. Left entirely to the discretion of the city government (Charter, 1898, Secs. 109-110).

B 17. Give statutory provisions regarding performance of public work by contract or direct employment.

Chicago. General City and Village Act, as amended by Act of Apr. 15, 1873, and Act of May 14, 1879, permits cities to provide water for public and private use by the erection, construction and maintenance of a system of water works, "provided that all contracts for the erection or construction of such works shall be let to the lowest responsible bidder," after three weeks' public notice. The Act of May 27, 1881 (Laws of 1881, p. 157), entitled "An Act to aid cities owning or operating waterworks to secure an additional or better supply of pure water," authorizes the city, through its Public Works Department, to enlarge or extend its source of supply from wells by lease, purchase or construction, and pay for the same out of the earnings of the water works, and not otherwise. Expenditure under this act requires a popular vote, and a majority of all votes cast at the election. Apparently this is a general act passed to meet the local needs of some town or city unknown, and applies to water from wells only. Nothing is said in the act about doing the work by contract. Apparently the act does not apply to Chicago, except to Norwood, annexed to Chicago Nov. 7, 1893, and supplied with water by the city from wells. In the case of Chicago vs. Hanreddy, 102 Ill. App., 14, confirmed in 201 Ill., 24, the right of the city to do any sort of public work or to make any kind of public improvement by direct labor where the estimated cost exceeds $500, is emphatically denied. Sec. 50, Art. 9, requiring public competitive bids, with letting to the lowest responsible bidder, was declared to be in full force, and was not repealed by the Act of June 14, 1897, providing for local improvements. Notwithstanding this decision, the Chief Engineer of the water works states that all pipe extensions are made, not by contract, but by direct employment, except where the same are paid for by special assessment. By the statutes (Act of Apr. 10, 1872, Art. 9, Sec. 50), all work paid for by special assessment must be done by contract. Under the decision in the Hanreddy case, it is clearly incumbent upon the city to do all pipe extensions costing more than $500 by publicly advertised competitive contracts.

Cleveland. Sec. 45 of the Municipal Code provides that no contract involving the expenditure of money and no ordinance or resolution for the expenditure of money shall be made until the auditor (or clerk, as the case may be,) has certified to Council that unappropriated funds are in the treasury to meet such obligation. Contracts for furnishing water to the corporation are specifically exempt. It is impossible to decide the relation of this provision to the old law, as one cannot tell how much of the old law was repealed by the new code as being inconsistent with it. For instance, under the old law it was held that the requirement of the auditor's certificate did not apply to a contract payable out of any fund not raised by taxation.

This raises the whole question, which has not yet been adjudicated, as to whether the new code establishes a separate water fund. Sec. 143 of the code requires the Board of Public Service, when any expenditure exceeds $500 (the expenditure first to be ordered by Council) to let the contract to the lowest and best bidder after advertisement. The language of the section is somewhat vague, and has been generally interpreted by the department in Cleveland not to include the expenditure for labor. The department, therefore, in practice habitually purchases material for pipe extensions by publicly advertised contract, and does the work by direct labor. I am informed by the department that, in case of constructing tunnels and buildings, or in making other extraordinary expenditures for construction, the whole thing would naturally be let by contract. This interpretation of the department has never been judicially ruled upon. It is the opinion of the law officers of the city that the money from the water works is to be legally considered a distinct and separate fund, to be devoted to the various purposes of the water works only, except as provided by Sec. 43 of the code, which apparently provides that money from any special fund may, upon resolution of the Council, duly advertised, and submitted in the form of a petition to the Court of Common Pleas, by order of the court, after public hearing, be transferred to other funds. Any person has the right to appeal to the Circuit Court from the decision of the Court of Common Pleas, and the case may be further appealed to the Supreme Court. While the water receipts are considered a special fund, and the works are supposed to be self-supporting, the city has no right to issue bonds depending on the receipts of the water department only, but uses the general credit of the city for this purpose. There seems to be no statutory prohibition on the city's using its general taxing power in support of the water works. I find no evidence that it has done so in recent years, although it uses the general credit of the city in the form of bond issues for extraordinary improvements and extensions. There were outstanding on Dec. 31, 1905, $46,000 of 5 per cent. bonds, and $4,220,000 of 4 per cent. bonds; a total of $4,266,000. The tax levy for the current year (Ordinance No. 2943 A, Sec. 5) has a tax of .0476 of a mill on the dollar for placing the connections for private service pipes, for which the property owners must pay, on streets about to be improved. The city frequently, to save delay to the street work, has to advance this money, which it afterward assessed against the property on which the connections are placed.

Syracuse. Answered under B 8.

B 18. Give statutory provisions regarding letting of public contracts.

Chicago. Under the provisions of the statutes cited in the answer to B 17 above, the matter is regulated by Secs. 1845-1856 of the revised ordinances of Chicago (ed. of 1905) which require (Sec. 1847) that the contracts shall be let by the Commissioner of Public Works and approved by the Mayor, after public advertisement, if the amount involved is more than $500; provided, that the contract may be let by the Commissioner without the approval of the Mayor by a two-thirds vote of the Council; but all contracts relating to public works must be authorized by the City Council.

Cleveland. By Sec. 143 of the Municipal Code the Board of Public Service makes a written contract after not less than two or more than four consecutive weeks of advertisement in a newspaper of general circulation in the city. The bids must be publicly opened and read, and the Board has the right to reject all bids. A part of the bids may be rejected for collusion without rejecting the others. All modifications of the contract must be in writing, signed by both parties; that is, in the form of a supplementary contract. If the work embraces both labor and materials, they must be separately stated in the bids. By Sec. 144 of the Municipal Code the Board of Public Service executes all contracts made by it, and must deposit a copy of each contract with the auditor. The Board is required to keep a record of its proceedings; acts by majority vote, and the members are prohibited from being interested in any contract made by the Board.

Syracuse. Answered under B 8.

B 19. Give statutory provisions regarding the issuance of bonds.

Chicago. Under the General City and Village Act of Apr. 10, 1872, this matter is left absolutely to the city government, provided the bonds be issued for any lawful purpose, and that the total indebtedness does not exceed the constitutional limitation (Constitution of 1870, Art. 9, Sec. 12) of 5 per cent. of the assessed valuation at the latest assessment for county and State purposes. See also answer to B 4 (c); and also constitutional amendment referred to under B 7.

Cleveland. Answered under B 7.

Syracuse. Answered under questions A 3 and B 6.

B 20. Give statutory provisions regarding use of income or any portion thereof.

Chicago. By Starr & Curtis, Chapter 24, Paragraph 447, all receipts from the water works are to be kept in a separate fund, and applied to the erection, construction and operation of the works, and the payment of interest and principal of bonds. If there be a surplus above these needs, such surplus is at the disposal of the Common Council for general municipal purposes.

Cleveland. This matter is left extremely vague by the new code. The only reference to it is in Section 7, Paragraph 16, which authorizes the city to apply moneys received for charges for water to the maintenance, construction, enlargement and extension of the works, and to the extinguishment of any indebtedness created therefor. In view of the fact that—as far as I can find out—the policy of this State has for decades been to have a separate water fund, and never to use the water receipts for any other purpose than for the water works, it seems a fair inference that the receipts may be used only for the extension and operation of the works, and paying the principal and interest of debt created for such purposes. See also answer to question B 17.

The present Corporation Counsel states to me orally that the only form in which the separate water fund has come up in Cleveland in recent years, is that in case of the annexation of territory. In case of annexation, the water pipes of the annexed territory become the property of the city of Cleveland. As a sort of compensation for the water distributing system annexed, the City of Cleveland has paid the debt of the annexed territory out of the water fund.

Syracuse. It is required (Laws of 1889, Chapter 291, Section 22) that the water board fix the rates for water, "including a just annual rate to be paid by the city at large on account of the use of water for municipal purposes;" and that the receipts for water be kept in a separate fund. By Section 23, the water fund is to be used for maintenance and operation, interest on the water debt, and the payment of the cost of necessary extensions and additions, and for the purchase and payment of principal of the water bonds. I am clearly of the opinion that this law, which has never been repealed, did not contemplate that any surplus from the water works should ever be used for other purposes, but that when the receipts were more than ample for the above purposes, the water rates should be reduced. Until the distributing system was virtually complete, extensions were made by new loans under the law. When the receipts began to be more than ample for current charges, the habit of charging the city for water for municipal purposes ceased. This charge had amounted at the beginning of public ownership to $26,000 annually; in later years, to $60,000. In 1903 the Water Department turned into the general treasury to lighten taxation, $36,224.76. No portion of the water bonds becomes due until 1920, except the $80,000 remaining unpaid of the last $100,000 extension loan. Five thousand dollars of this $80,000 must be paid each year. Under the law it would seem that the surplus income, which is now available, ought to be applied to the purchase of bonds in the open market, or to the accumulating of a sinking fund to pay the principal of the bonds, or to a fund for laying a second conduit to Lake Skaneateles. The surplus earnings cannot be legally used for lightening the burden of general taxation.

B 21. Give statutory provisions regarding depreciation.

This matter is not mentioned in the case of any one of the cities.

B 22. Give statutory provisions regarding sinking funds.

Chicago. The constitution of 1870 (Article 9, Section 12) requires that any city creating any indebtedness shall, before the date or time of doing so, provide for the collection of an annual tax sufficient to pay the interest on such debt as it falls due, and to pay the principal within 20 years.

Cleveland. There is no provision for a separate sinking fund for bonds issued for water works purposes, as these bonds are part of the general debt of the city, although there is an attempt in practice to make the Water Works Department carry its own debt. The appropriation for the current half-year for interest from the water fund is $90,000. By Section 101 of the code, every municipal corporation having outstanding bonds is authorized, in addition to all other taxes authorized, to levy an annual tax sufficient to pay the interest and to provide a sinking fund large enough to meet the principal when due. The sinking fund levy for the current year is three mills on the dollar. (Ordinance No. 2943 A.)

Syracuse. By Section 96, Act of 1898, thirty per cent. of the revenue from other sources than municipal taxation shall be paid into a sinking fund for the extinguishment of the city's debt; and by Section 99, such fund shall be in the custody of the Comptroller under the Board of Estimate and Apportionment, and the ordinances of the city.

B 25. Give statutory provisions regarding the audit of accounts.

Chicago. The general city and village act (April 10, 1872), Article 6, Paragraph 74, authorizes the Council, by ordinance with two-thirds vote of all Aldermen elected, to create offices, prescribe their duties, and provide for their election, or appointment by the Mayor, with confirmation by the Council. The Department of Public Works is created by Section 1816 of the revised municipal ordinances, and placed in charge of the water works. Section 1843 of the code requires that the records of this office shall be open to examination by the Comptroller, Finance Committee, and any member of the Council, at all times. Under the same statute (Article 2, Section 11) the Mayor has the power to examine the records of any agent or officer of the city. The methods of accounting for all departments of the city are prescribed, and placed in charge of the Comptroller, by Section 47 of the revised municipal code of 1905. Section 51 of the code requires monthly financial reports from all departments of the city to be made to the Comptroller upon request of the Comptroller; and Section 28 requires the Comptroller to require all officers charged with the receipt or expenditure of revenues, or with the authority to incur expenses, to make monthly statements in writing, under oath, showing in detail such expenses, and to file the same in his office.

Cleveland. By Section 123 of the Municipal Code the city Auditor—elected for a term of three years—is required to audit the books of all departments at the end of each fiscal year. He prescribes the form of keeping accounts and making reports for all departments, and inspects and revises the same at pleasure. When any person ceases to be an officer at any time for any reason, the Auditor audits his accounts, and when any claim is presented to the Auditor, he may examine any person under oath concerning such voucher or claim.

These powers of the Auditor are apparently subject to "An act to create a bureau of inspection and supervision of public offices, and to establish a uniform system of public accounting, auditing and reporting under the administration of the Auditor of State," approved May 10, 1902, and amended April 22, 1904. This act requires that all accounts of public officers, general and local, shall be kept on forms prescribed by the State Auditor; and Section 4 of the act especially requires that the accounts of public service industries shall be so kept as to show the true cost. Section 8 requires the State Auditor, or any person authorized by him, to examine the financial affairs of any public office and officer at least once a year. He is permitted to make such examination at any time. The State Auditor is required to call for detailed reports from every taxing district and public institution once a year, the said reports to be made within thirty days after the close of the fiscal year. The Auditor has unlimited power to take testimony under oath, and examine books and papers. The expenses of such audit are to be paid by the taxing district.

Soon after the passage of the act of 1902, the examiners of the State Auditor spent several weeks examining the municipal accounts of all departments of the City of Cleveland, and made a considerable report thereon. I cannot find that any change in the method of bookkeeping of the Water Department was brought about thereby, or that any subsequent extensive examination has been made by the State Auditor. I believe that annual reports by the different city departments are made to the State Auditor by filling out very brief printed blanks furnished by the Auditor.

Syracuse. By the laws of 1898, Section 48, the Mayor is given the power, through himself or his agents, at any time, without notice, to examine any of the city accounts, and to administer oaths to witnesses and to take affidavits. Laws of 1905, Chapter 705, as amended by Chapter 59 of the acts of 1906, provide for annual reports to the State Comptroller by the city Comptroller of cities of the second class within 60 days after the close of each fiscal year. Section 2 authorizes the State Comptroller to prescribe the form of reports, which must contain: (1) a statement of the receipts from all sources; (2) a statement of disbursements; (3) a detailed statement of the indebtedness; (4) a statement of the costs of ownership and operation, and the income of each and every public service industry owned or operated; and (5) any further information required by the Comptroller. Section 5 of the act requires the State Comptroller to have the accounts of every fiscal officer of the municipality examined after this act goes into effect, and as often after the first examination as the Comptroller deems necessary. The State Comptroller is authorized (Section 6) to appoint for the purpose a chief accountant and not to exceed two examiners; the first to receive a salary of $2,500 and his necessary expenses, and the examiners, $5.00 a day each, and expenses. The State Comptroller, Chief Accountant, and each examiner has the right to administer oaths, compel the attendance of witnesses, and the giving of testimony. False swearing in such cases is perjury. The reports of such examiners shall be open to public inspection. The original act appropriated $10,000 a year for the purposes of the act.

B 24. Give statutory provisions regarding publication of reports.

Chicago. No statutory provisions. Municipal Code, Section 1860, requires the Commissioner of Public Works on or before May 1st in each year, to present to the City Council "a report showing the receipts and expenditures, and entire work of the department during the previous fiscal year." Section 1861 (municipal code) requires that within three months of the beginning of the fiscal year the Commissioner of Public Works shall present in detail to the Comptroller, to be by the Comptroller laid before the Council, estimates setting forth in detail the needed expenditures for repairs and improvements for the current year, so far as the same are to be paid for out of the general fund.

Although the statutes do not require the publication of any reports by the Water Bureau or by the Department of Public Works, of which the Water Bureau is a part, and although the ordinances do not require the publication of such a report, it has been the custom since the first public water commissioners were established in 1851 for the city to publish an annual report in regard to the water works of the city; and until the Board of Public Works was established by act of February 18, 1861, the Water Commissioners made a semi-annual report which was published. Section 1883 of the code of Chicago provides that the Superintendent of Water shall pay over the moneys received by him daily to the treasurer, and make a report to him with the designated account to which the moneys paid over belong.

Cleveland. Section 5 of the act referred to under B 23 requires the substance of the annual reports made to the State Auditor to be published in an annual volume of comparative statistics, and submitted by the Auditor to the Governor for transmittal to the Legislature at the next regular session, or to a special session when required.

Section 58 of the ordinances (edition of 1896, latest) requires the Director of Public Works (under the new code, the Board of Public Service) to make an annual report to the Council setting forth the operation and business of his department for the year. I find no statutory or ordinance requirements that this should be published, but, as a matter of fact, each of the three grand divisions under the Board of Public Service, of which the water works is one, publishes an elaborate annual report. The water works report for the year ending December 31, 1905, makes a printed volume of 126 pages, apart from the special sanitary report of 200 pages. Full reports of the Cleveland water works have been published each year from the foundation of the works, and, in fact, all the preliminary committee reports and engineers' reports were published before the works were started.

Syracuse. Under the laws of 1898, Section 68, the Comptroller is required, on or before January 1st, to publish in book or pamphlet form, verified by oath, a full, accurate statement in detail of the financial condition of the city. Under Section 3, Chapter 705, of the laws of 1905, the State Comptroller is required to publish "the substance" of the reports required by the provisions of that act. See also answer to B 23.

B 25. Give statutory provisions regarding salaries paid.

Chicago. Under the statutes this is left entirely to the Council.

Cleveland. By Section 117 of the code the Council fixes the salaries of the members of the Board of Public Service. The members of this board are elected for terms of two years, and there salaries cannot be increased or diminished during their terms. By Section 145 of the code, and Section 129 as amended April 7, 1904, this board has the sole right of employing all persons performing service under the board. It fixes the compensation of all such persons, and "no person shall be removed except for cause satisfactory to such directors, or a majority of them." It was decided in the case of Kelly vs. Cincinnati, 7 N. P. 360, that the board cannot delegate the power of removal; but that one of its superintendents having large numbers of men under him may temporarily suspend one of his men for insubordination or dereliction of duty, until he reports the same to the board and the board acts. By resolution of the board, No. 1573 (1905), the pay for laborers was fixed at 22c. per hour or $1.76 per day of eight hours; of foremen or inspectors, at 42c.; teams, 44c.; plumbers, 50c.; electricians, 43¾c.; carpenters, 40c.; meter installers, 27.5c.; caulkers, 25c.; watchmen, $2 per day, except as otherwise provided.

Syracuse. Under the Laws of 1898, Sec. 98, of Ch. 182, the Board of Estimate and Apportionment has the authority to fix the salary and compensation of all city officers and employees, except as otherwise provided in this act. This clause covers all salaries in the water bureau. Such salaries and compensation, after the first instance, must be determined before the election or appointment, and shall not be changed during the term for which one is elected or appointed. Since the Civil Service Law went into effect the provision on changing the salary without the change of the incumbent, would seem not to apply to those under the Civil Service Law. All of the employees in the water bureau, except the superintendent and the cashier, are under the Civil Service Law.

The following is a copy of a statement by Mr. H. B. Myron, Chief Examiner and Secretary of the Civil Service Board, under date of August 25, 1906:

"Enclosed you will find a rough draft of the positions in the Water Department, as shown by the official roster for the year 1901. Enclosed you will will also find a true copy of the official roster of the Water Department for the year 1906.

"According to the roster for the year 1901 there were about 68 employed regularly in the department. Among this number were 16 watchmen. On the roster for the year 1906 you will not find many watchmen. There are, however, in the employ of the Water Department, at least six or eight laborers who are doing work similar to the work performed by persons who were designated as watchmen in 1901. The persons to whom I refer are employed in shifts, and are ready to respond to any complaint of a break or leak in the water mains.

"I simply call your attention to this one point in order to show you that a comparison of the records, copies of which are enclosed, would not necessarily show the exact difference in the working force of the Water Department for the years 1901 and 1906.

"I also desire to inform you that all those who appear on the roster for the year 1906 are now in the employ of the department.

As to whether or not all persons who appear on the roster for the year 1901 were all employed, I am unable to state. I shall try to get this information for you, however, if you desire it."

Roster of Positions in Bureau of Water, 1901.

Superintendent.
Assistant Superintendent and Supply Agent.
Cashier.
Chief Inspector of Meters.
General ledger bookkeeper.
Assistant engineer.
General foreman.
Bookkeeper.
Frontage tax clerk.
Assistant general foreman.
Meter and hydrant repairer.
Gatekeeper.
Stockkeeper.
Assistant meter repairer.
On and off service.
On and off service.
Vacancy (?) inspector.
Vacancy (?) inspector.
Trench inspector.
Plumber.
General inspector.
Foreman and inspector—3.
Watchman.
Meter reader—7.
Clerk repair department.
Schedule clerk.
Schedule clerk.
Clerk and timekeeper.
Clerk.
Meter clerk.
Service clerk.
Meter reader and setter.
Foreman hydrant repairs.
Service box inspector.
Janitors—2.
Watchmen—16.
Valve repairers—4.
Hydrant repairers—3.
Total—68.

Roster for the Water Department, August, 1906.

Name.	*Title of Position.*	*Date of App't.*	*Salary.*	
John F. Delaney	Superintendent.	Jan 1, 1904	$2,600	annually
John Venner.	Chief Inspector.	Jan. 1, 1892	2,500	"
J. G. Butler.	Cashier.	Jan 1, 1892	1,600	"
L. O. Morgan	Bookkeeper and Clerk.	Feb. 1, 1895	1,500	"
William Eddy.	Bookkeeper and Clerk	July 1, 1894	1,500	"
F. M. Wakefield.	Clerk.	Oct 5, 1895	1,100	"
Benj. Round.	Ass't Gen. Foreman.	May 1, 1899	1,020	"
Wm. F. Jones.	Clerk Repair Dept.	June 20, 1895	1,000	"
Thomas Mack.	Schedule clerk.	Mar 1, 1888	1,000	"
William Daley.	Clerk & stenographer.	Aug. 27, 1892	960	"
E. L. Deming.	Schedule clerk.	Feb. 17, 1892	1,000	"
John H. Horton.	General inspector.	May 9, 1901	840	"
William Connery	Meter & Hydrant repairer.	May 2, 1882	840	"
Wm. H. Kaefer	Hydrant repairer	June 30, 1892	840	"
Geo. Whiteman.	Foreman.	Mar. 5, 1900	840	"
Jacob Lietman	Meter reader	June 14 1894	840	"
Wm. H. Jones.	Meter reader.	Aug. 27, 1895	840	"
Samuel D. Frey.	Meter reader	Dec. 20, 1897	840	"
George F. Sax.	Meter reader.	Feb. 1, 1898	840	"
Wm. G. Jenkins.	Meter reader	Mar 10, 1902	840	"
C. F. Hathlins.	Meter reader.	Mar. 10, 1902	840	"
Louis D. Korb.	Meter reader	Mar 1, 1904	840	"
Daniel Hammell	Meter reader	Jan. 24 1905	840	"
F. B. Drumm.	Meter reader.	Jan. 2 1906	840	"
Grace Smith.	Clerk.	Apr. 27, 1903	820	"
Kate S. Smith.	Clerk.	Dec. 26, 1895	820	"
Edward Conlon.	Gatekeeper.	July 1 1890	720	"
John H. Venner.	Clerk.	Jan. 1, 1896	720	"
H. B. Tibbitts	Meter reader & setter.	Apr. 1, 1899	720	"
H. C. Hammond.	Clerk.	May 8, 1905	720	"
Patrick Coyne.	Watchman.	July 1, 1894	720	"
P. F. Morris.	Watchman.	Jan. 1, 1900	720	"

Name.	*Title of Position.*	*Date of App't.*	*Salary.*
Thomas Foran.	Watchman.	Jan. 1, 1900	720 annually
Daniel W. Ehle.	Watchman.	July 2, 1894	720 "
Frank Buies.	Watchman.	Sept. 23, 1895	720 "
Wm. J. Preston.	Watchman & Janitor.	Mar. 12, 1900	720 "
Michael McGraw.	Plumber.	Mar. 2, 1900	3.00 per day
John F. Keefe.	Plumber.	Jan. 18, 1906	3.00 per day
John T. Harrison.	Gate valve repairer.	Mar. 5, 1900	2.00 per day
Charles Brand.	Hydrant repairer.	Mar. 5, 1900	1.75 per day
Ed Atherton.	Gate valve repairer.	Mar. 5, 1900	1.75 per day

While there is much dispute as to the effect of the Civil Service Law on the Water Department, and while the enclosed list showing the date of appointment of each member of the Water Bureau, except the laborers, will throw some light on the question, perhaps it is just to remark that during the six years of Mayor McGuire's administration there can be but little doubt that the payroll was padded, chiefly with laborers, in all the departments of government employing large numbers of laborers, such as the Water Department.

An examination of the water reports will show that during the term of the succeeding Mayor, Kline, the payroll of this bureau was reduced about $18,000 a year.

It is said that during the last year of Mayor McGuire's incumbency the *Post Standard* published a list of 85 names of laborers in the Water Department that had never reported to the office for work, and that the padding of the rolls was so extensive that the Superintendent of Water refused to sign them, but permitted his assistant to sign them for him; and that Mayor Kline later refused to reappoint this Superintendent on the ground of these stuffed payrolls, saying that he would not permit him to hide behind his assistant.

The facts show that at present the force is reasonably stable in the department, with the exception of the laborers; but the Civil Service Law has not been able to prevent the regular and systematic assessment of Water Bureau employees for campaign purposes. I believe the scale of assessment to-day is 5 per cent. on all salaries above $1,000, and 3 per cent. on those below that sum, with entire exemption of anybody who does not receive more than $1.50 per day. This is Republican practice. Democratic practice was to assess everybody on the payroll, including the scrubwomen.

The Council under present statutes has no authority in the matter of salaries of water employees—Prior vs. City of Rochester, 166 N. Y., 548. When an officer's salary is fixed, if it be withheld, he can recover it—Grant vs. Rochester, 175 N. Y., 473; French vs. Rochester, 175 N. Y., 474.

B 26. Give statutory provisions regarding wages to day laborers.

Chicago. Apparently this is left under the ordinances (Revised Code of Chicago, 1905, Sec. 1838) to the Commissioner of Public Works, who has the power to appoint and dismiss all officers and employees. Under Sec. 1837, he shall have the management and control of all matters and things pertaining to the department.

Cleveland. By Sec. 145 of the Municipal Code the Board of Public Service appoints and removes, if need be, and fixes the compensation of every person employed in any capacity in the service of the department.

Syracuse. Answered under B 25, above.

B 27. Give statutory provisions regarding hours of labor of day laborers.

Chicago. Under the Act of March 5, 1867, eight hours constitute a day's work in the absence of special contract. No further statutory limitation.

Under the revised ordinances (1905), Sec. 1926, the eight-hour day is established "upon all work performed under any contract entered into with the City of Chicago." Under Sec. 1927 of the ordinances the working day consists of eight hours between 6 A. M. and 6 P. M., but this provision does not apply to "any department or workshop where constant operation is necessary." Employees of the city who come under the eight-hour regulation are paid at the rate of pay and a half for overtime.

Cleveland. Where no agreement is made, a day's work (in mechanical, manufacturing, and mining businesses) shall consist of eight hours (Revised Statutes, Sec. 4364-62). The statute of April 16, 1900, undertook to establish an eight-hour day for laborers, workmen and mechanics working for the State or any subdivision thereof, and for any contractor constructing public works for the State or any minor division thereof. On December 2, 1902, in The City of Cleveland vs. The Clements Brothers' Construction Company, the Supreme Court declared the act unconstitutional, under Secs. 1 and 19 of Art. 1 of the Constitution.

Syracuse. By the Laws of 1897 (Ch. 415, Par. 3, as amended by Laws of 1899, Ch. 567, and of 1900, Ch. 298), eight hours constitute a day's labor. This law applies to the State and municipal corporations, and to contractors working for the same. By the same statute preference is given to citizens of the State of New York, and only citizens of the United States may be employed.

B. 28. Give statutory provisions regarding pensions to employees.

Chicago. By General Act of May 14, 1905, applying to cities of more than 100,000 population, a pension fund for employees in water works only, who draw more than $45 a month, is created and placed in the hands of a Board of Trustees consisting of the Mayor, the Comptroller and four employees contributing to the fund, elected by the contributing employees for terms of two years, after the first term. The funds for such pensions are to be derived wholly by retaining a portion of the wages or salary (gifts and bequests excepted), the contribution of each to be determined by the Board of Trustees, provided, that the amount be not less than 1 nor more than 2 per cent of the annual pay of the contributor. The trustees determine the amount of benefits within the maximum of 50 per cent of the salary or wages at the time of retirement. Employees 50 years old, who have contributed to the fund for 10 years, and have been for 20 years connected with the water works may retire on a pension of 50 per cent. of their last monthly pay. The widow and minor children, in case of death of the father, shall receive a total of one-half the pension of the father so long as the widow remains unmarried, and the children are under 18 years of age. Upon the death of a contributor who is not entitled to benefits by length of service, his widow or minor children are entitled to $300, and if there be no widow or minor children, $300 may be spent by the trustees for burial expenses. One who has contributed five years may receive a pension for two years upon retiring for a disability. A contributor for five years, upon dismissal or resignation, may receive half that he has contributed. If one who has contributed for 12 years is dismissed or resigns, he may continue the necessary payments until he becomes entitled to retire on a pension. Such pension fund is entirely exempt from attachment. Under this act the trustees have been chosen, and the system organized.

Cleveland. No statutory provisions for pensions to employees of the water works. Ohio statutes authorize pension funds for firemen, policemen, sanitary policemen, and school teachers only.

Syracuse. No provisions.

B 29. Give statutory provisions regarding strikes.

Chicago. By an Act of August 2, 1895, amended by Act of April 12, 1899, and Act of May 11, 1901, a board of voluntary arbitration for all labor controversies is established, but without special provisions for city employees. By the earlier acts this board could deal with strikes or lockouts only upon request of one or both parties; but by the amendment of 1901 the board may, upon its own initiative, investigate strikes and publish the results of its findings. These, however, have no binding force; but for the purpose of investigation the board can compel the attendance of witnesses. The decisions of this board have binding force in case only that both parties to the controversy have asked the intervention of the board. Even then either party may withdraw from the decision after six months, with due notice. While such settlement is binding, the court is prohibited from enforcing the decision by imprisonment.

Cleveland. I find nothing bearing directly on the subject of strikes; but by Sec. 5601 of the Revised Statutes, any person having any controversy, except such as may involve the title of real estate, may submit such controversy to the arbitration of any person or persons agreed upon, and "may make such submission rule of any court of record in the State." Unless the municipality is disabled by positive law, it may be a party to such arbitration. Springfield vs. Walker, 43 O. S., 543.

There is also a State Board of Arbitration, appointed under the Act of Feb. 10, 1885, amended in 1893 and again in 1895, and again in 1897. This seems to be an entirely voluntary affair, and to be unimportant. Sec. 13 requires the Mayor or Probate Judge to notify the Board of Arbitration when any strike or lockout is seriously threatened, or begun. The board may also act on its own initiative, and if the employer concerned employs more than 25 persons in one line of business the board shall undertake to bring about an amicable settlement.

Syracuse. No legislation bearing especially on strikes of city employees. General legislation on mediation and arbitration—Laws of 1897, Ch. 415, Art. 10. So far as I can find out these laws have never been invoked in the case of difficulty between a municipality and its employees.

B 30. Give statutory provisions regarding citizenship of employees.

Chicago. By Act of June 1, 1889, persons paid from public funds, directly or indirectly, including those working for contractors on public work, must be citizens of the United States, or those who have declared their intention of becoming such. The failure to take out final naturalization papers for three months after one is entitled to do so forfeits one's rights to such employment. Under the Civil Service Law (Act of March 20, 1895,) applicants for positions in the classified service, which service includes all persons connected with the water works below the Commissioner of Public Works, must be citizens of the United States.

Cleveland. No provisions.

Syracuse. Laws of 1897, Ch. 415, Par. 13, as amended by Laws of 1902, Ch. 454, preference is to be given to citizens of the State of New York, and only citizens of the United States shall be employed.

B 31. Give statutory provisions regarding other important matters.

Chicago. Starr & Curtis (1896), Ch. 82, Par. 24, gives the workmen or the furnisher of material for public improvements a lien on the payment due the contractor, and in case of city work it is made the duty of the city, upon due proof of claim, to pay for such material or labor out of funds due or to become due to the contractor. Sec. 1854 of the revised ordinances of Chicago requires the Commissioner of Public Works in letting contracts to insert provisions in accordance with this act, and to retain not less than 15 per cent. of the contract price until he is satisfied that the contractor has paid for all material and labor for the work. Sec. 1855 requires the Commissioner of Public Works to cease payment on a contract until the contractor has paid the sums due for all labor and material, and pay for the same himself out of any money due the contractor.

Cleveland and *Syracuse.* ———

B 32. Are the laws relating to the construction and operation of works applicable to municipal and private plants alike?

B 33. If there are any differences, state them.

Chicago. Private companies construct their works and operate under ordinance contracts with the city, and are left free to do what they want with their income under the contract. The funds of the public water works are reserved for operation and extensions, while any surplus goes into the general fund.

Cleveland. No differences, so far as I understand the question.

Syracuse. The Laws of 1897, Ch. 415, Sec. 3, as amended by Laws of 1899, Ch. 567, and of 1900, Ch. 298, give the right to laborers on private, but not on public (municipal or State), works, to contract out of the eight-hour day. Under the Laws of 1897, Ch. 415, Par. 14, stone used in municipal work, except paving blocks and crushed stone, must be dressed in the State.

B 34. If any State board, commission, or other authority has control or supervision over municipalities as regards waterworks, give statutory provisions relating to its powers and functions.

Chicago. No provisions.

Cleveland. Secs. 409 to 425 of the Revised Statutes require the State Board of Health to respond promptly when called upon by the local Board of Health "to investigate and report upon the water supply, sewerage, disposal of excreta, heating, plumbing, or ventilation of any place or public building, and no city, village, corporation, or person, shall introduce a public water supply or system of sewerage, or change or extend any public water supply or outlet of any system of sewerage now in use unless the proposed source of such water supply or outlet for such sewerage system shall have been submitted to and received the approval of the State Board of Health." By Secs. 409-427, R. S., the State Board of Health is required to examine and report annually the condition of all public water supplies.

For the powers of the State Auditor over the reports and accounts of the Water Works Department, see answer to B 23.

Syracuse. No such board except that the State Board of Health, under Ch. 25 of the general laws, Art. 2, Sec. 25, has the right to inquire upon complaint or upon its own initiative concerning nuisances or causes of danger or injury to life or health within the municipality. They have the right to enter all premises where nuisances or conditions dangerous to life or health are known or believed to exist. They act at their own peril as to abuse of discretion: Kent vs. Village of North Tarrytown, 23 Misc. N. Y., 86. By the same act the board may make health rules and regulations, and provide penalties for the violation thereof, and may perform all the functions of a local Board of Health, when there is no local Board of Health, and they have general supervision over local Boards of Health. The Laws of 1893, Ch. 661, Sec. 7, as amended by Laws of 1903, Ch. 468, authorize the State Board to protect from contamination all public supplies of potable water and their sources, and to impose suitable penalties for noncompliance.

B 35. What have been the effects of this supervision?

Chicago ———.

Cleveland. The State Board of Health has made a vigorous fight, under its limited powers in the matter, to compel the filtering of water, and in addition to prevent so much sewage from flowing into the lake. (See An. Rep., 1903, pp. 170-180.) In 1894 the board refused to approve the sewer system for the west side of Cleveland on the ground that it would pollute the water supply. Upon renewed application, by a decided majority it refused again March 27, 1895, unless the city water was filtered. The result was a conference between the Board and the Chamber of Commerce of Cleveland, at which the State Board agreed to accept the recommendations of a board of experts of national reputation, to be appointed. The board of experts, duly appointed, recommended the new five-mile tunnel, and a sewer system emptying 10 miles to the east. The board kept to its promise, and approved the plan, although it says that the pumping station to flush the river included as part of the recommendation of the experts has never been built. The board admits that the effect of the new tunnel has not yet been determined, but insists that the water ought to be filtered. The board, in its report of 1903, says that it gave its consent with "decided reluctance," and declares that in any foreign city a typhoid epidemic as large as Cleveland's "would be heralded as a disgraceful sensation on both sides of the water." In the five years beginning with 1898 there were 906 deaths, representing probably 11,225 cases.

Syracuse. Soon after the Act of 1893 the State Board of Health adopted a complete code for the protection of the waters of Skaneateles. The Water Board of the City of Syracuse approved the rules. Judging by the clipping from the Syracuse *Journal* of August 21, 1906, which is in part as follows: "Syracuse water supply befouled by filthy waste. Rules and regulations of the State Board of Health promulgated 10 years ago violated every day along the shores of Skaneateles Lake. 'The water from Skaneateles Lake, which we drink every day, is contaminated water,' said a local physician to the *Journal* to-day. These are the facts: that all the waste matter from the toilet rooms and the slops from the kitchen at the hotel at the head of Skaneateles Lake flow directly into the lake; that outhouses for the convenience of those who occupy property along the shores of the lake stand over little brooks which carry the contents of these outhouses into the lake; that during the summer season men and women and boys and girls bathe in the lake on both the eastern and western shores along almost its entire length from Skaneateles village to Fair Haven; that it is from this body of water that the people of Syracuse obtain their water for domestic purposes"; and also to judge from my own observation on the spot, these rules seem to be largely disregarded. There is no regular continuous inspection or control of the watershed. There are numerous villages and many summer cottages, and at least one large hotel immediately on the shore, while the lake is a favorite summer resort with several large steamers running on it.

B 36. Does the municipality make regular reports to State boards or commissions as to the results of operation?

Chicago. No.

Cleveland. Yes. Reports to the State Auditor and to the State Board of Health, on very brief printed blanks furnished by these departments (from 1 to 3 pages).

Syracuse. Yes. See answer to B 23.

B 37. Is there any authority not connected with the municipality itself which examines the water and character of the service?

Chicago. No. The city itself makes daily analyses of the water and publishes the results.

Cleveland. See answer to B 34.

Syracuse. Not regularly. The State Board of Health, upon request of the city, if the city will pay the expenses thereof, or if the State Board have available funds of its own, will undertake the work and make a special examination. It is needless to say that usually both these bodies are short of funds for the purpose.

B 38. Are the results of such examinations published?

Chicago. Answered under B 37.

Cleveland. Yes.

Syracuse. Usually.

B 39. If judicial or administrative orders have been issued by State authorities relative to the municipal water works state them and give source and date of issue.

Chicago, Cleveland and *Syracuse.* Nothing except in regard to the State Board of Health explained under B 35.

B 40. Has the municipality unrestricted power as regards its own plant?

(a) To fix rates charged for water?
(b) To fix rates charged for meters, appliances, etc.?
(c) To raise money by taxation to defray current expenses?

Chicago. The city has the power to fix rates for water, meters, etc., except that under the Act of Apr. 19, 1899, as amended by the Act of May 18, 1905, the rates must be high enough, together with the taxes provided for in this act, to meet operating expenses and pay the principal and interest of the bonds, also to make necessary extensions and repairs.

The city may levy taxes to defray current expenses, but subject to severe restrictions; namely, to the total maximum of 5 per cent. for all taxing bodies of the territory, and next by the 2 per cent. limit for all municipal purposes—Act of Apr. 10, 1872, as modified by an Act of Apr. 19, 1899, as amended by an Act of May

18, 1905, as modified by the Constitutional Amendment of 1904.

See also answer to B 7.

Cleveland. The city has unlimited power over the rates for water meters, appliances, etc., and also unlimited power, under the following conditions, to levy taxes for current expenses. Under Sec. 9 of the Municipal Code the city has the special power to levy and collect taxes. By Sec. 32 taxes may be levied "for the purposes of paying the expenses of the corporation, constructing all improvements authorized, and the exercising of the general and special powers conferred by law." The Legislature is the judge of what is a public purpose (Walker vs. Cincinnati, 21 O. S., 14). Sec. 33 of the Municipal Code fixes the maximum rate of taxation at 10 mills on the dollar. The city for the current year levies the maximum of 10 mills. The following taxes, amounting for the current year to 3.5 mills, are outside of the 10-mill limitation: sinking fund and interest, 3 mills; firemen's pension, .222 of a mill; police relief fund, .25 of a mill; sanitary police pension fund, .028 mill. The city has nothing to do with levying State, county, and school taxes, all of which are necessarily in addition to the above total of 13½ mills. By Sec. 34 of the code, taxes beyond the limit, and apparently to any extent, may be levied for any lawful purpose if the levy be authorized by a popular vote of two-thirds of those voting on the proposition, the election for such purpose being duly authorized and held under an ordinance.

Syracuse. The city has full power over the rates for water, meters, and appliances.

Its power in regard to taxation has never been ruled upon by the courts. Most of the officers about the City Hall declare that the department is carried on exclusively under the special legislation, chiefly the Acts of 1889 and 1890, and that this legislation does not authorize such taxation. My own opinion is that the general legislation for cities of the second class, with its amendments, is not in conflict with the special legislation referred to, and gives ample power to the city to construct, enlarge, maintain and operate water works by general taxation, in case it desired to do so. The revenues of the bureau have been such hitherto as to prevent the need of such taxation. I think this is a fair inference, although the point was not specifically ruled upon, from the decision in Alvord vs. The City of Syracuse, 163 N. Y., 160, where the court said in speaking of the year 1890: "The expense of the acquisition, maintenance and extension of the water works and plant was charged on the whole city, the city being remunerated by rates levied upon the consumers of water." The supplying of water has time and again been declared by the New York courts to be a "city purpose" under the New York statutes, and rights are given the city to levy taxes for city purposes.

C—PUBLIC SUPERVISION OF PRIVATE COMPANIES.

This schedule applying to private companies only, does not apply to Chicago, Cleveland, and Syracuse.

C 1. Date of incorporation of company.

C 2. Place of incorporation of company.

C 3. Was incorporation under,

(a) General law, or (b) special legislative act, or (c) administrative order, or (d) other method?

Indianapolis. The company was incorporated at Indianapolis Apr. 23, 1881, under a general act of Feb. 4, 1881. This is supposed to be the only company ever organized under that act. The previous company, which went into bankruptcy, was incorporated Oct. 1869 under an Act of March 6, 1865.

New Haven. The company was organized at New Haven in 1849, under a special charter, Act of 1849.

C 4. For what length of time was original incorporation to be effective?

Indianapolis. Fifty years.

New Haven. Perpetual; no time mentioned.

C 5. If this duration has since been extended or decreased, state when, how, for what period of time, and reasons therefor.

Indianapolis. As the Act of Feb. 4, 1881, gives the company the rights and privileges and imposes upon it the duties and obligations of the old company, I consider that the charter of the present company expires in 50 years from the date of the first charter in 1869. The counsel and other officers of the company claim for the company a life of 50 years from the Act of 1881. There certainly is no specific mention of a time limit in the charter of 1881.

New Haven. ————.

C 6. Was the power of alteration or amendment of this original charter reserved to the State?

Indianapolis. No.

New Haven. Yes, by Par. 11.

C 7. State succinctly the powers conferred by this charter.

Indianapolis. The charter was limited to 50 years. The city was authorized to take as much stock in the company as it pleased. The company had the right to enter upon, survey, and take by condemnation such land and property as was necessary. The city was compelled to grant street locations and a site for the works, and permitted to subject the company to reasonable regulation as to the use of the streets, charging and collecting of tolls and the rates, both public and private, to be charged; provided, that "no restrictions shall be imposed by said Common Council which will prevent such company realizing upon its capital stock an annual dividend of 10 per cent. after paying the costs of all necessary repairs and expenses." The city had the right to purchase all the property, rights and franchises of the company after 25 years, the price to be fixed by joint arbitration by a board of five. The city was given the right to purchase on the same terms before the end of the 25 years, if the company earned more than 10 per cent. annually, in addition to ½ of 1 per cent. annually for the reserve or contingent fund. By Sec. 11 the company was required to submit to the city and publish in the newspapers for 10 successive days a financial report of the condition and operation of the company. Under ordinance contract of Jan. 3, 1870, the city has the right to purchase at any time on six months' notice, and if the company fails to keep this contract, it forfeits all the rights, or, at the discretion of the city, all claims of payment for water used by the city. Under amended ordinance of January 24, 1870, such forfeiture is to take place only by judgment of a competent court; provided, that "the right of such city to purchase such works shall accrue immediately if, at the end of twelve years from the time of organization of such company, or at the expiration of any year thereafter, it shall appear that such company has imposed and collected such rates or charges for the supply of water as shall have caused the average annual income or dividends of such company on its capital stock to exceed 10 per cent., after paying the cost of all necessary repairs and expenses, and exclusive of ½ of 1 per cent. per annum, which may be set apart or reserved as a surplus or contingent fund." The company had the right to fix its own rates within these limits.

New Haven. The right to be a corporation, with the usual powers of such body, for the purpose of supplying the City of New Haven with pure water for domestic and public uses. The capital stock was to be $100,000 to $200,000, par $50; at least $50,000 to be subscribed before organization. No limit on the dividends; the stock to be paid as and when directors determine. The company had the right to open the streets, alleys, etc., of New Haven, and to lay, repair, and maintain pipes without the consent of the city authorities; the right to acquire any lands and right of way by voluntary agreement; the power to acquire a right of way over the property of private persons through the intervention of the court.

C 8. What were the limitations specified in the original charter, particularly as regards, (a) the area to be served, (b) stock to be issued, (c) bonds to be issued, (d) dividends to be paid, (e) prices to be charged, (f) sources of supply, (g) purity of water, (h) location of wires, (i) audit of accounts, (j) taxation, (k) compensation for franchises, (l) publication of reports, (m) making of returns to governmental authorities, (n) other important matters?

Indianapolis. The company was to serve the city of Indianapolis; might issue $500,000 in stock (Certificate of incorporation, 1881; amount unlimited in act of 1865). Bonds not mentioned in charter, but under the laws of the time, could be issued at the discretion of the company; dividends were limited to 10 per cent., under penalty of forfeiture. The price could be regulated by the city, but not so as to yield less than 10 per cent. dividend, with ½ per cent. annually for contingent fund. No mention of the matters under (g)-(k) inclusive. The company was required to publish annual reports under oath ten successive days in the newspapers before the annual meeting. No other returns. The company was authorized to take by condemnation "all such real estate as shall be necessary to carry on the business, and forward the objects and purposes of said company." This clause was meant to include reservoirs and water sources, as well as real estate for other purposes.

New Haven. The company was to serve the territory of the City of New Haven; to issue not to exceed $200,000 of stock. No mention was made of bonds, but under Connecticut jurisprudence corporations not specifically limited had unlimited borrowing power. There was no restriction on dividends, nor on prices, nor as regards sources of supply, and no provisions for audit; no mention of taxes or compensation for franchises, or making returns, or publishing reports. The water was to be "pure," and the books of the company to be open to the inspection of the stockholders.

C 9. Have any changes ever been made in the original charter as regards powers and limitations of the company? State how, when, to what extent, and for what reasons.

Indianapolis. None, except as previously noted—under the act of February 4, 1881, authorizing new incorporation with the same powers as under the previous act.

New Haven. By amendment in 1851, the company was given the right to take water from any stream below a point where the same was used for mills; to construct, maintain, and repair the necessary reservoirs, canals and tide-gates; to abolish existing, and prevent the creation of future nuisances affecting their interests, and to exercise the right of eminent domain through the intervention of the court for the acquiring of any private property needed for their purposes. The amendment of 1856 permits increase of share capital to $450,000, with loans at not exceeding 7 per cent., to the amount of one-half the capital paid in, and invested by said company. Certificate under oath of the amount of capital paid in and investment of the company to be made to the State Comptroller. Under this act, Section 3, and under another amendment passed 1857, the company was given the right to change certain highways to accommodate their reservoir. These provisions were repealed June 23, 1860, before the company acted under them. The act of June 23, 1860, authorized the company to condemn certain public roads, bridges and lands in the Town of Hamden, provided that the company at its own expense provided other roads and lands to the satisfaction of the Selectmen. Section 7 of this act authorized the company to establish such public hydrants at such places as it wished, to lay pipes to any house or building with the consent of the owner, and to "regulate the use of the said water within and without said city, and establish the prices or rents to be paid therefor." This is the first mention of the price of water for public or private use. Section 8 gave the company the power to prevent waste and stealing of water, and the right of entry on private property served for this purpose. Section 9 required anybody who wantonly injured the water or property of the company or committed any nuisance in connection therewith, to pay triple the damages. The amendment of June 10, 1863, declared that the company had already spent $400,000 on the work, and authorized a total bond issue of $200,000. The amendment of June 30, 1866, gave the company the same rights in East Haven as in New Haven. The amendment of June 2, 1861, authorized a total share capital of $1,000,000, and a total bond issue not to exceed one-half of the share capital, and not to exceed $500,000. The amendment of June 22, 1876, increased the number of directors from seven to nine. The amendment of March 19, 1880, authorized a total share capital of $1,500,000, to be paid in cash or its equivalent, and required that the new shares should be offered to existing stockholders. This is the first prohibition of stock watering or stock dividends. The amendment of 1882 is an entire departure from American legislative methods as far as they have come under my observation. It confirms a certain contract between the company and city and town of New Haven, making that contract an amendment to the company's charter, and also of the city's charter. Section 2 of the act specifically enables the city or any person or persons to maintain suitable action in the courts to obtain damages from the company under the stipulations of the contract. This new method of legislation seems since to have become chronic in Connecticut. The amendment of March 19, 1889, authorizes a maximum share capital of $2,000,000, new shares to be offered to existing shareholders, not below par, on terms determined by stockholders. The bond issue is not to exceed $1,000,000, and not to exceed one-half of the sum "actually expended in the construction or purchase of its works." The amendment of 1895 authorized the consolidation with the Fair Haven company as explained elsewhere. The amendment of April 5, 1897, authorized an increase of the share capital, to be paid in cash or its equivalent, to a maximum of $3,000,000. By Section 2 of this act, the limitation of the bonds of the company to one-half the amount invested in the works disappears, and the bonds are limited to one-half the capital stock then outstanding. By amendment of April 23, 1897, the company was given the same rights in the town of Branford that it had in the City of New Haven, provided the town of Branford approved this act by popular vote, and that any corporation which has, or may obtain at the present session of the Legislature, the right to supply such town with water, gives its consent. By the amendment of May 13, 1897, the State Board of Health, after notice to the Mayor of New Haven, and the Selectmen of any town affected, and after public hearing, is given the power to regulate or prohibit fishing, skating and boating on the waters of the company; such action not to affect any existing rights of the company. Orders to be enforced by injunction at the suit of the company, penalty $25.00, provided, further, that the company pay proper damages for the injury of any vested interests in these waters injured by this act; such damages to be determined as the damages for taking lands and water rights by the company. By amendment of June 1, 1903, to the charter of the New Haven Water Company, and also of the charter of the City of New Haven, the contract between these two parties, dated February 17, 1902, is confirmed, and made part of their respective charters, also a certain stipulation, dated February 17, 1902, given by the New Haven Water Company to the City of New Haven, was made part of the charter of the company, whenever the city chooses to exercise the option therein referred to. This stipulation is explained more fully hereafter. By amendment of June 22, 1905, the company was authorized to lay its mains and supply water for public and domestic use in the towns of Bethany, Woodbridge, Branford, Cheshire, Hamden, North Haven, Prospect, North Branford and Milford, provided that where any other company is lawfully engaged in supplying water to any one of such towns or its inhabitants, the written consent of such company shall be obtained by the New Haven company from such company, before it begins operations in such town. In 1864, the company obtained from the Legislature a special act under the form of a general act, requiring written permission from the company to enable any one to fish in any of the reservoirs of the company. This provision was carried into the provisions of the general fishing laws, acts of 1901, Chapter 140, Section 51. (See General Statutes 1902, Section 3163.) The penalty under the act of 1864 was $7.00 or ten days imprisonment.

C 10. What fees were required at the time of incorporation?

Indianapolis. None.

New Haven. None. If any, they were purely nominal fees meant to compensate for the clerical expense of recording. A notice, October 21, 1903, from the Secretary of State, that the acceptance by the company of the act of June 1, 1903, was received, bears this legend, "Fee for recording $1.00, please remit." The company is not aware, and I can find no evidence that even such nominal fees were required in 1849 when the company was incorporated.

C 11. Was any payment made during the past year to any local or State government for privilege of incorporation?

Indianapolis. None.

New Haven. None.

C 12. What State authorities have power to supervise, regulate or control the operations of the company?

No such restrictions upon the *Indianapolis* company.

The *New Haven* company is subject to a mild regulation of the Legislature, and the State Board of Health.

C 13. Give references to statutes providing for such supervision.

C 14. Give references to the general State laws which relate to water works and water companies.

Indianapolis. Under the general municipal corporation act in force April 15, 1905, Section 53, Paragraph 31, the Council has power to regulate the making of connections with water and other pipes, and to compel owners of property to make such connections before streets are improved. By Paragraph 36, the Council has power to license and regulate the supply, distribution and consumption of water, and to regulate the laying of mains and pipes; to fix the price by contract or franchise, and to compel the performance of contracts for the extension of mains. By Section 54, the Council has the right to investigate and examine into "the affairs of any corporation, firm, or person in which the city may be interested, or with which it may have entered into a contract, or may be about to do so." Such investigation carries the power to compel the production of books and papers, with appeal to the court to enforce the same. One may be compelled to testify against himself in such cases. Under Section 93, Paragraph 9, the Board of Public Works of the city has the power to contract for a supply of water for public or private uses, and to fix the terms and conditions of such supply. By Section 93, Paragraph 8, the Board of Public Works, under direction of an ordinance for the purpose, which ordinance must have been aproved by popular vote, may buy all the necessary lands and materials; construct and operate water works, or may purchase and hold stock in corporations organized for that purpose. Section 139 gives the Board of Public Works, under the limitations already noted, complete charge of the financial and physical operation of the works. The by-laws and regulations of the Board for this purpose, so far as not in conflict with the constitution and laws, have the force of ordinances. Officers and employees must, as nearly as may be, be chosen on the bi-partisan principle; that is, not more than one-half from any one party. The Board must make monthly financial reports to the Comptroller, and an annual report, which must be published with the Comptroller's report (Section 88-2). Moneys must be turned over to the treasurer weekly, and receipts therefor filed with the Comptroller, and the Board may make contracts for the erection of works, purchase of machinery, and the manufacture and laying of pipes, and for other work, materials, or supplies in connection with the work. Such contracts must be ratified by the Council. The City Council may through a committee investigate the management of the water works at any time, and must do so at least once a year. Contracts for the work to be done for the Water Works Department must be let to the lowest responsible bidder, after two weeks' public notice. Such contracts must be ratified by the Common Council. The Council has the power to levy a general annual tax of not exceeding $.50 for paying for the construction, completion, repairing, or rebuilding of water works, paying interest and principal of bonds issued for such purpose. The jurisdiction of the city shall extend ten miles beyond the limit of the city for the purpose of preventing pollution. "In addition to the powers given in this section, the Board of Public Works in any such city shall also have and exercise all the executive powers given in this act in relation to the purchase, or condemnation, erection and management of water works." By Section 249, when any city determines to erect water works, or other public utilities (Section 93, clause 8), or to purchase or lease such works, it may issue bonds in denominations of $50 to $1,000, to run from five to thirty years, not to exceed 6 per cent. per annum in such quantities as it pleases, and at such prices not below par. The question of such purchase, erection, or lease, must be submitted to and approved by popular vote, after which the Council by ordinance shall approve such contract for erection, purchase, or lease of the works. At least twenty days' notice of such election must be given. By Section 250, the city may take by condemnation the real estate, sources, etc., or easement therein, or use thereof, necessary for the erection and operation of such works. This clause is wide enough to include the condemnation of all kinds of property rights. "No such works or plant shall be so purchased subject to any lien or incumbrance already thereon, which indebtedness, when added to the indebtedness of such city or town, would make a sum in excess of 2 per cent. of the value of the taxable property within such corporation." By Section 252, the Board of Public Works, except as otherwise provided in this act, has complete control, and management of the water works. By Section 253, the city by ordinance may contract with any person or corporation to construct and operate a system of water works for public and private use. In granting such franchise, the city shall agree upon the terms and prices for both public and private use "as well as for reasonable license fees, or other compensation" for the franchise or privilege. By Section 254, such franchises are limited to twenty-five years, and cities are authorized to buy and hold stock in such companies, and to borrow money for that purpose. There seems to be no limit to the amount to be borrowed for such purposes, or to the length of the time for such bonds to run. Bonds are not to bear more than 6 per cent. interest, and not to be sold below par. All such contracts are subject to the confirmation of the Council. By Section 256, private water companies have the right to condemn necessary lands and waters within or without the city for their purposes. By Section 257, the city is authorized to levy a general tax to pay principal and interest of money borrowed for the erection, purchase, lease, completion, extension, or improvement of any water works. The tax is not to exceed $0.50 on the $100.00, with poll tax of $1.00. When the city has contracted with any private company, or has issued bonds to pay for stock in such company, it may levy taxes to meet such obligations not to exceed $0.35 on the $100, together with poll tax of $1.00.

New Haven. General Statutes (1902), Section 1328, as amended by Chapter 28, Laws of 1905; also Sections 2593-2598 inclusive, and Sections 2602 and 2603, and the general amendment to this code of June 18, 1903. These acts provide in general a fine of $100.00, or six months, or both, for polluting reservoirs or sources of any public water supply, and prohibit the throwing of dead animals, or bathing in such waters. Special penalties for willful pollution. Under Section 2596, local health officers, with consent of the county health officers, may have samples of water examined by the State Board, at the expense of the local board. By Section 2599, reservoirs and cemeteries are not to be located within one-half mile of each other, except the court find that such location will not be detrimental to health. Section 2602 prohibits the washing of animals or things in water used for public supply, or the placing of any substances where they will wash into such supply, after the local health authorities have declared such substances injurious. Section 2603 authorizes the Governor, on application of a town, borough, city or company, to appoint special policemen to protect such water supply from contamination; such policemen to be paid by petitioner. The act of 1903 authorizes either a company or a municipality to enter premises on their respective water sheds, and to abate nuisances thereon at their own expense. The court may order the removal of any building, or enjoin any use of land or building injurious to the water. This act allows any public or private water company to condemn according to law any land necessary to protect their water supply. The regular procedure—through appraisers appointed by the court—as in the case of expropriation, must be followed. No other general legislation is applicable to this company, except Section 4160, Revised Statutes of Connecticut (1902), Chapter 104 (Laws of 1901), which provides that when either a public or private water company has a lien on real estate for water rents, such lien shall continue not more than a year, except the party having the lien give such notice before the end of the year as is required for the extension of tax liens. Such notice extends the lien for two years with interest at the rate of 6 per cent. until the sum is paid.

C 15. Give references to the special laws relating to this water company.

Indianapolis. Act of March 6, 1865, and act of February 4, 1881.

New Haven. Answered under C 9.

C 16. Give statutory provisions regarding size and location of plant.

C 17. Area to be served.

C 18. Give statutory provisions regarding nature of plant or equipment.

Indianapolis. No provisions except that the company is to serve the City of Indianapolis.

New Haven. No provisions except the detailed one in regard to area to be served, to be found in the charter acts explained under C 9.

C 19. Give statutory provisions regarding extension of mains.

C 20. Give statutory provisions regarding improvements and new processes.

No provisions in the case of either company.

C 21. Give statutory provisions regarding price of service, arrangement of charges, discounts, deposits, etc.

Indianapolis. By contract with the city these matters may be regulated by the city, provided that no such regulation shall reduce the dividends below 10 per cent., with provision for a reserve fund of one-half of 1 per cent. annually. Prices for water for public use are always regulated by such contract. The city, however, in practice has never undertaken to exercise any significant control or influence by contract or otherwise over water supplied for private use. It was provided by Section 3, ordinance of January 3, 1870, that the company might charge for water "as much as the average price paid by other cities of the United States, and the citizens thereof of like population, that are supplied with as efficient water works, unless a less price may be agreed upon, but the company may not demand or charge a greater price." The prices within this limit are to be determined by a joint arbitration board of five members, non-residents, as often as once a year at request of either party. The maximum price for fire hydrants, however, was to be $50.00 at all times. These meaningless provisions have all been dropped out of the later contracts, which simply fix the price for public use, and leave the company to fix the price for private use at its discretion.

The matters referred to in C 21-46 following, are largely regulated by contract with the city, authorized by the general statute of March 6, 1865, and confirmed by the general statute of February 4, 1881.

New Haven. The prices are to be fixed by the company, save as regulated by contract with the city. The whole subject of the contract between the city and the company, and the general history of the company is dealt with in a supplement to this report.

C 22. Give statutory provisions regarding character and quality of service.

Indianapolis and *New Haven.* Regulated entirely by ordinance contracts.

C 23. Give statutory provisions regarding issuance of stock.

Indianapolis. At discretion of company, up to the charter maximum of $500,000.

New Haven. Answered under C 9.

C 24. Give statutory provisions regarding issuance of bonds.

Indianapolis. Under the general act of February 4, 1881, rate limited to 6 per cent.; time, amount and price, not regulated. Bonds may be given the right of vote. This applies only to water companies organized to buy out under the law another company which is sold at foreclosure sale.

New Haven. Answered under C 9.

C 25. Give statutory provisions regarding depreciation.

Indianapolis. Not mentioned by name. The company is authorized to meet "the costs of all necessary repairs and expenses" before reckoning its dividends.

New Haven. Not mentioned.

C 26. Give statutory provisions regarding amount and use of profits.

Indianapolis. The charter evidently requires reduction of charges when earnings exceed operating expenses, 10 per cent. dividend, and ½ per cent. annually for surplus.

New Haven. No provisions except in contract explained under C 21.

C 27. Give statutory provisions regarding dividends to be paid.

Indianapolis. The city is authorized to regulate charges and operations of the company provided such regulation does not reduce dividends below 10 per cent., plus ½ per cent. annually for surplus. The city has the right of immediate purchase at arbitrated price if the company earns or pays above 10 per cent.

New Haven. No provisions, except in contract as explained under C 21.

C 28. Give statutory provisions regarding compensation for franchises.

C 29. Give statutory provisions regarding audit of accounts.

No provisions in the case of either company on these matters.

C 30. Give statutory provisions regarding examination and inspection of records.

Indianapolis. No specific provisions. See answer to C 14.

New Haven. Books of company to be open to the stockholders.

C 31. Give statutory provisions regarding publication of reports.

Indianapolis. Section 11 of the charter (March 6, 1865,) is as follows: "Such company shall annually, at least 10 days before the election of directors, make out a full and complete exhibit of all the operations of the company during the current year, containing an accurate account of all the receipts and disbursements thereof, also showing the amount of capital stock actually paid in, the amount paid out during the year in the construction and repair of the works, the amount paid out in the ordinary expenses of the company, classifying the expenditures and giving the amount paid out under each classification, as the same appears on the books of the company, the amount collected from such city, and the amounts collected from individuals for water supply; the amount placed to the credit of the reserve fund; the amount of dividends declared, and the amount of such dividends drawn; which exhibit shall be verified by the oath of the president and secretary, and published in some public newspaper of general circulation in such city 10 days successively before such annual meeting."

It would appear that the reports actually published by the company are not in the detail anticipated by the statute, and are of no particular value to the public.

New Haven. No publication required, and none made, in fact.

C 32. Give statutory provisions regarding settlement of claims for injuries or death.

Indianapolis. See answer to C 35.

New Haven. Revised Statutes (1902), Section 1094, fix the limit of damages for death by negligence at $5,000. Section 1136 provides for the distribution of damages for injury or death if the death occurs during the pending of the suit. In that case, by Section 399, half goes to the husband or widow, and half to the lineal descendants. If there be no descendants, all goes to the husband or widow; if no husband or widow, to the heirs as in the case of a person dying intestate. An amendment of June 9, 1903, to Section 1119, requires an action for damages for injury to the person or to personal property caused by negligence, to be brought within one year of the injury or negligence complained of. Acts of 1903, Chapter 193, declare that pending actions for personal injury shall not lapse because of the death of the injured party, or of the person causing the injury, but in that case the damage shall be limited to $5,000, and the action must be brought within one year of the neglect complained of. Section 4702 of the general statutes requires the master to employ reasonable care in providing a safe place and instrumentalities, and competent colaborers, and to appoint a vice-principal whose default shall be the default of the master.

C 33. Give statutory provisions regarding wages to day laborers.

No provisions in either case.

C 34. Give statutory provisions regarding hours of labor of day laborers.

Indianapolis. No provision except that by Section 629 of Statutes of 1905, a penalty of from $10 to $100 a day is imposed for employing a child less than 14 years of age more than eight hours a day.

New Haven. No special provisions for water companies. Under the general statutes of 1902, Section 4692, eight hours constitute a legal day unless otherwise agreed.

C 35. Give statutory provisions regarding employers' liability.

Indianapolis. By acts of 1893 (P. 294) every corporation except municipal corporations is liable to its employees for injury if the employee is in the exercise of due care and diligence.

(1) If the injury is from defects in the condition of apparatus, machinery, etc., due to the negligence of the corporation or of any person entrusted with keeping the property in good condition.

(2) When the injury is from the negligence of any one to whom the injured party is subject.

(3) When the injury comes from the act or omission of any person, done or made in obedience to the rules or regulations of the corporation, or in obedience to the particular instructions given by any person delegated with the authority of the corporation.

(4) Where the injury results from the negligence of a co-employe or fellow-servant engaged in the common service of the corporation, such person obeying the order at the time of the injury of one having authority to direct.

To recover, employees injured must be free from contributory negligence; Perigo vs. The Indianapolis Co., 21 Ind. App. 338. Damages shall be measured by the injury sustained, unless death results from the injury. In case of death, damages are limited by other statutes. By Section 285, Burns' Revised Statutes of Indiana (1901), the amount of damages in case of death is limited to $10,000, for the exclusive benefit of the widow or widower, or children, or next of kin. The action must be brought within two years after the accident. By the Acts of 1899 (P. 405), Section 285a, judgments for personal injury survive the death of the claimant. By Section 294 actions for damages by accident must be brought within two years. By Section 299, action for damages in case of death must be brought within 18 months after death.

New Haven. Explained under C 32.

C 36. Give statutory provisions regarding strikes.

Indianapolis. No provisions.

New Haven. There seems to be no legislation on strikes.

Section 1296 (Revised Laws, 1902) fixes a penalty not to exceed $100, or imprisonment not more than six months, for intimidating or threatening anyone and preventing him from doing any legal thing. This section applies to boycotting. It has been decided that to threaten an employer if he keeps a certain person within his employ is within the prohibition—55 Connecticut, 70 and 71.

Sections 1297 and 1298 prohibit employers from requiring their workmen to abstain from joining labor unions, and from blacklisting employees.

C 37. Give statutory provisions regarding citizenship of employees.

Indianapolis. Under the new general municipal act (April 15, 1905), Section 94, the Board of Public Works has general supervision over the streets, alleys, and public grounds of the city. It may have work thereon done by direct labor or by contract at its discretion, except such as is paid for by special assessment in whole or in part. When contracts are made for this purpose, they must stipulate under proper penalty that the contractor will give preference to residents of the county and city.

New Haven. No provisions.

C 38. Give statutory provisions regarding conditions under which employees labor.

No provisions in either case.

C 39. Give statutory provisions regarding other important matters.

Indianapolis. No provisions except in regard to purchase. See answer to C 7.

New Haven. By an "act concerning corporations" (Laws of 1903, Chapter 194, Section 37), every corporation having capital stock, except such as are specifically exempted by this section (the exception does not include water companies), must report to the Secretary of State:

(1) The names and addresses of officers and directors;

(2) The amount of outstanding capital stock not fully paid, with the amount due thereon;

(3) The location of its principal office;

(4) The name of the person or agent on whom legal process may be served.

After this is recorded by the Secretary of State, it is certified to the town clerk concerned, and twice a year the town clerk reports to the Secretary of State the names of all corporations whose returns have been filed with the clerk. The Secretary of State then reports to the Attorney General the names of corporations which have failed to file their certificates with the town clerk, and the Attorney General collects the penalty of $100.

C 40. What means have been provided for the enforcement of the above provisions (C 16-39)?

Indianapolis. It is uncertain how far the rights of investigation given to cities under the act in force April 15, 1905, apply to companies previously chartered under the general law. For these provisions see answer to C 14.

New Haven. The provisions are insignificant.

C 41. Are they adequate or inadequate?

Indianapolis. The only attempts at supervision or control have been made by the city, not under the statute, but under its ordinance contract with the company.

New Haven. ———.

C 42. Describe defects in remedies and penalties.

Indianapolis. No effective control can be exercised over corporations until the public has greater authority to prescribe the methods of keeping accounts and of records, and of making reports, and until there is a thorough and frequent audit of accounts and publication of reports—not such as are published at present by this company, but such as show the condition and operation of the company.

New Haven. ———.

C 43. If any other State board, commission, or other authority has control or supervision over water works companies, give statutory provisions relating to its powers and functions.

C 44. If judicial or administrative orders have been issued by State authorities relative to water companies, state them, and give source and date of issue.

No provisions in either case.

For *New Haven* see the answer to C 14.

C 45. What have been the effects of this supervision?

Indianapolis. There is no supervision except by the city, and that does not relate to operation of the company, but chiefly to the opening of the streets, with some tendency in the last two years to exercise some control over the sanitary quality of the water.

New Haven. ———.

C 46. What powers of supervision over the construction and operation of the plants of private companies does the city possess?

Indianapolis. For the powers of the city over the water company under the act in force April 15, 1905, see answer to C 14.

Cities in Indiana had the right to establish their own water works before the general law of March 6, 1865, under which the original Indianapolis company was organized; and also had very wide powers of supervision over private companies. This supervision has been exercised chiefly by contracts with the company for 10-year periods. The first contract ordinance is dated January 3, 1870, amended January 24, 1870; renewed June 27, 1887, for three years; renewed again January 6, 1892, and again August 19, 1901.

New Haven. The city has no powers over these matters, except the right of control and regulation over the streets. This right of control and regulation over the streets cannot be construed as a right to impose conditions or burdens on the company for the use of the streets. By the revised ordinances (July 10, 1905), Section 470, streets may be opened only by a permit from the Director of Public Works. He is required to exact a bond to put the streets in order and pay any damages. By Section 472 the fee for a permit is $1.00. The company regularly pays this, and estimates that its fees for street openings amount to from $150 to $250 a year. The fee is probably illegal. The Supreme Court of Connecticut in 44 Conn., 105, ruled that such fees could not legally be higher than the amount necessary to compensate the city for the expense of issuing the permits, and clearly intimated that 50c. a permit was probably a maximum legal charge. This dictum was in a case of the New Haven Water Company against the attempt of New Haven to lay a graduated license tax on the company for opening the streets. This graduated fee, as levied, ran from $1 up to $50 for opening a paved street, with $10 for every 500 ft. of pipe laid. The court ruled that this was clearly in excess of the power granted the city. Section 473 requires the work to be done under the Director of Public Works, and forbids the refilling of any opening except under his supervision, or that of an assistant. Section 475 permits pavement with cement or concrete foundation to be opened by the Department of Public Works only, the expense to be charged to those asking the opening. By Section 477 the permit of any corporation to open the streets will be revoked if the corporation becomes indebted to the city. The city derives this power over the streets from Paragraph (c), Section 137 of the city charter, which gives the Council power "to make, maintain and regulate public hydrants, and provide the same with water; to protect the same from injury, and prevent the unnecessary waste of water," and from Paragraph (i), same section, "to regulate and prohibit the excavation of streets, highways and public grounds for public and private purposes, and the regulation of any work or thing therein, whether temporary or permanent, or under the surface thereof, the moving of public buildings thereon, and to regulate the laying of gas and water pipe in the streets of said city." In the case just cited, the court decided that the provision giving the city power over the streets could not by implication repeal the specific provision in the company's charter giving the company the right to lay pipes in the streets. In other words, that the clause could not infringe on the rights of the company, and confined the city to reasonable regulation of the company in the exercise of its legal rights. The same principle was maintained in Welch vs. Hotchkiss, 39 Conn., 143.

C 47. What provision has the city made for the exercise of its powers of supervision?

Indianapolis. Under the statute in force April 15, 1905, Section 93, all powers of supervision over public works and public utilities, except such as relate strictly to sanitary affairs, are placed entirely in the Board of Public Works. This board does not seem to have made any serious attempts at regulation.

New Haven. City has no power.

C 48. How frequently and with what efficiency does the city exercise its powers of supervision?

Indianapolis. Only when new pipes are to be laid, or new works established.

New Haven. The city has no powers.

C 49. Has the company resisted the enforcement of the legal provisions regulating and providing for public supervision?

Indianapolis. No; because it is a matter of contract with the city. It is not impossible that friction may arise should the city undertake to enforce the powers of investigation granted by the general municipal act, in force April 15, 1905, Section 54.

New Haven. No occasion for resistance. The company has successfully resisted the levying of an illegal fee for opening the streets (see answer to C 46); and has also resisted in the courts, but in vain, the assessment for purposes of taxation placed upon its property by the City of New Haven. (New Haven Water Co. vs. City of New Haven, appeal from the Board of Relief on the assessment of 1900. Superior Court of New Haven County; case entered April, 1901, decided April 18, 1902. Judgment for the defendant.)

C 50. If so, has the position of the company been upheld by the courts?

C 51. What provisions have been found impossible of enforcement, and why?

Both questions answered elsewhere.

C 52. What taxes are paid to State authorities? Explain fully.

(a) Basis of levy.
(b) Method of assessment.
(c) Principles of valuation.
(d) Rate of taxation.
(e) Method of collection.
(f) Disposition of receipts.
(g) Other important matters.

Indianapolis. The company pays nothing to the State except an annual general property tax. The assessments are made for all purposes by township assessors. (There are three townships wholly or partly in Indianapolis; six other townships and four villages in Marion County.) The assessments are equalized by a County Board of Review, and again equalized by the State Tax Commission and certified to the County Auditor, who certifies the assessment to the City Clerk. The State tax rate is fixed by statute, and levied on this assessment. For 1905 the tax was 12c. on the hundred dollars of assessed valuation; also a State school tax, 11.6c.; a benevolent institution tax of 8c.; an educational institution tax of 2.75c. The township assessors are required to assess the property at its fair cash value; the personal property each year, and real estate once in four years. The assessors are elected once in four years. Property owners, as a basis for the assessment, make sworn returns to the assessor, who has the right to examine the owners or any other person under oath, and to view the property, and fix the value at his own discretion (Acts of 1903, P. 345).

Water companies, by an act of 1903 (P. 551), and certain other corporations, have to make additional statements to those required of individuals, on forms prescribed by the State Auditor, to furnish a basis for valuing the franchises, and for the assessing of the capital stock by the county board. Failure to make these special returns is subject to $100 a day penalty. In addition to the township assessor, there is elected once in four years for each county a county assessor. He is, in fact, the tax inquisitor. He must keep his office open throughout the year. All township assessments are submitted to him, and he has the right, with the consent of the county board, to examine records outside the county, and view outside the State, with the view to discovering omitted property. He has all the power of the township assessor for administering oaths, and for inspecting books, papers and premises. He places his own valuation on such property. This right extends to additions of omitted property after the taxes have been equalized. He is especially required to instruct township assessors in their duties.

By the acts of 1903 (P. 65) there is created a County Board of Review, consisting of the County Assessor, the County Auditor and the County Treasurer, and two free-holders appointed by the Judge of the Circuit Court. The township assessors perform their labors between March 1st and May 15th. The board equalizes and adjusts all individual assessments at discretion, except those on railroad track and rolling stock of railroads, but no property shall be added or the list of assessments raised without notice to the persons affected. The board may examine persons on oath, and compel the attendance of witnesses, books and papers. The board is authorized to subtract indebtedness from credits listed. Although the board deals with individual assessments, it also equalizes the assessments as between townships. The board may even set aside the assessment of the whole county, and order a new one, and may order the individual assessors to increase or lower their assessments. In counties with more than 20,000 population the annual session shall not exceed 20 days, except in years when real estate is assessed. The session in counties with more than 50,000 population may last 45 days.

There is also a State Board of Tax Commissioners, consisting of the Governor as chairman, the Secretary of State and the Auditor of State ex-officio, and of two paid members, not more than one from any one political party, appointed for four years by the Governor. This board performs three distinct kinds of functions. It has unlimited power to send for persons, books and papers; to administer oaths, and make investigations. It has a general supervision over the whole matter of assessing and collecting taxes. It makes the original assessment of the track and rolling stock of railroads on the basis of sworn returns made by the owner to the County Auditor. It equalizes the assessment among counties, and it acts as a Board of Appeal on action taken by the County Board of Review. Any township or county assessor, any member of the County Board of Review, or any aggrieved party, may appeal to the State board from the action of the county board. The assessments, as finally equalized by the State board, are certified to the State Auditor, and by him certified to the County Auditor, who extends all taxes to which property is subject, and turns over the tax duplicates to the County Treasurer, who acts as collector in Indianapolis (in cities of the first class which are county seats).

By the acts of 1897 (P. 141), Section 142, the County Auditor is required, after due notice to interested parties, to assess and add to the assessment lists any omitted property. The writ of mandamus lies against the County Auditor for this purpose, on the relation of any State officer, of the State Board of Tax Commissioners, or of any taxpayer in the county. Either party may call for a jury in such cases.

By the acts of 1903 (P. 55), Section 74, the special return of franchises and capital stock made by corporations to the assessor is turned over to the County Board of Review, which determines their value. If the value of the capital stock so determined exceeds the value of the tangible property, the excess is taxed. Where no tangible property is found, the capital stock is assessed at its cash value. If the franchise is of greater value than the capital stock, the franchise is assessed at its full value, and no assessment is made on the capital stock.

In Indianapolis (cities of the first class which are county seats) the County Treasurer acts as both city, State and county collector, collecting all dues, licenses and taxes paid by the citizens of Indianapolis for all purposes, except (1) a tax on navigation companies by the Act of March 7, 1901, Sections 22 and 23; and (2) an excise tax of 1 per cent. on the capital stock of certain corporations (Acts of 1903, P. 82, Section 1). All taxes except road taxes are payable in two installments, on the first Monday in May and the first Monday in November. If the first installment is not paid when due, the whole amount becomes delinquent, with a penalty of 10 per cent. on the first installment. If the taxes still remain delinquent on the first Monday in November, 6 per cent. is added to the delinquency on the May installment, and 10 per cent. on the installment due in November. (Acts of 1897, P. 153, Section 152).

Taxes are turned over by the collector to the disbursing officers of the bodies for which the taxes are levied. In the case of Indianapolis, the County Treasurer, who collects all the taxes, with the exceptions named, acts as both city and county treasurer. The funds of these two bodies, therefore, lie in his hands until appropriated and spent by the city and county respectively. The taxes fall due in two installments, on the first Monday in May, and the first Monday in November. The County Treasurer must pay over the money due the State by June 15th, and by January 1st.

New Haven. The State of Connecticut has the inherent power of taxation. It has not, however, for many years, laid any direct State property taxes. Were it to do so, judging by analogy, the property tax would doubtless be levied and collected much as similar taxes are levied and collected for local purposes. The State does levy a franchise tax on certain kinds of corporations, but not on water companies.

C 53. What taxes are paid to local authorities? Explain fully

(a) Basis of levy,
(b) Method of assessment,
(c) Principles of valuation,
(d) Rate of taxation,
(e) Method of collection,
(f) Disposition of receipts,
(g) Other important matters.

Indianapolis. For 1905, the following county rates:

General purposes, 29c.
Sinking fund, 4c.
Repairing gravel roads, 4.65c.
Center Township, 1c.
Wayne Township, 2c.
Warren Township, 3c.

POOR RELIEF:
Center Township, 1c.
Wayne Township, 2c.
Warren Township, 1c.

CITY TAXES:
City schools, 47c.
City library, 4c.
Industrial school, 5c.
Kindergarten, 1c.
General city tax, 81c.
Police pension fund, 1c.
Firemen's pension fund, 1c.
City sinking fund, 2c.

TOTAL LOCAL TAXES:
Center Township, $1.8165.
Wayne and Warren Townships, each 2c. higher.

These are the rates in the three townships which cover the major portion and more important parts of Indianapolis.

The water company pays general property taxes on such portions of its property as lie outside these three important townships. The company has property in some villages and townships outside the city. These each have their rates of taxation; that is, Center Township, total local, $1.0365; total state and local, 1.35; Broad Ripple, total local, 1.0865; total state and local, 1.40; and Washington Township, total local, .8665; total state and local, 1.18.

The total taxes paid by the company to the city, county and State in 1905, were:

In the City of Indianapolis	$39,193.49
Center Township outside the city	1.35
Broad Ripple Village outside the city	155.40
Washington Township outside the city	78.10
Total taxes	$39,428.34

In addition to these taxes, the company paid in 1905 special assessments of $1,729.44. These consisted of four separate sidewalk assessments, one assessment for opening a new street, and one sewer assessment. See also D 52.

New Haven. This company pays no taxes to any authorities, except the ordinary property tax to the localities in which its property is located. A large portion of its property is situated in the outlying towns, which levy and collect taxes from the company very much as the city of New Haven levies and collects taxes on the property within its limits.

The taxes paid by the company since 1901 are as follows:

Amounts paid city for opening streets, estimated $150 to $250 per year.

Taxes Paid.	Total.	City.	Outside Towns.
1901	$17,508.50	$9,294.88	$8,213.62
1902	$20,381.75	$11,030.71	$9,351.04
1903	$19,852.26	$11,369.82	$8,482.44
1904	$23,010.64	$12,294.28	$10,716.36
1905	$22,098.28	$12,567.02	$9,531.26
1906		$13,368.32	

Recently the functions of the town of New Haven were transferred to the City of New Haven, and the taxing bodies unified.

(Act of December 7, 1897.) There are still two small school districts and three recently annexed wards of the city which make exceptions to this rule, but these exceptions are not essential for our present purpose. Property, real and personal, is assessed annually at its full value under the statute, and the tax rate fixed annually by the City Council and approved by the Mayor. The Council, however, is limited in its action by the Board of Finance. This board when it gets into full operation will consist of the Mayor (who is chairman), one Alderman elected annually by the Aldermen, and six citizens who are not to hold other office in the city. The board is to be non-partisan. The citizen members appointed by the Mayor are to serve two years, three to be appointed each year. All members serve without pay. The board is to meet each week and at other times on call of the Mayor. In the month of November it makes an estimate of the amount of money needed to run the city for the next calendar year and the rate of taxation necessary to produce this sum. The board must give notice to each department and virtually a public hearing to the officers of each department on the needs of the department. Each department submits estimates to the Board of Finance in October of each year. The estimates of the board are submitted to the Council the first week in December, and within five days thereafter published once in each daily paper in New Haven. The Council can change any item in these estimates, including the rate of taxation, only by two-thirds vote, but the Council cannot even then increase any item of appropriation or the rate of taxation, or reduce any item relating to the interest or principal of the municipal debt, nor may the Council make appropriations beyond the estimated income. By Section 46 of the charter the Board of Finance may order the discounting at current rates of interest of taxes assessed and not yet payable. By an amendment of April 19, 1905, a tax committee, consisting of the Mayor, Comptroller, Corporation Counsel, one Alderman elected by the Aldermen, and three citizens appointed by the Mayor, has the right to order the compromise and settlement of any existing claims for taxes or assessments, but no deduction or abatement shall be made on the ground that the property was assessed too high. By Section 301 a special tax may be laid after the same manner as the regular taxes when the Board of Finance deems it necessary. By Section 303 the Mayor and Board of Aldermen may abate the taxes "assessed against persons who are poor and unable to pay." The order of abatement must be signed by at least five members of the Board. There is a bi-partisan Board of Assessors consisting of five members, with five-year terms, one going out each year, appointed by the Mayor. In October of each year each taxpayer hands in a list of his property, real and personal, subject to taxation, with the value thereof, under oath. The assessors, taking these lists as a basis, attempt to fix the true value of the property, including that of any unlisted items, so far as they have knowledge. They may add 10 per cent. to the value if the owner fails to list the property. From such assessment the taxpayer may appeal to the City Board of Relief. This board is bi-partisan, appointed by the Mayor, term three years, one member going out each year. From the action of the Board of Relief the taxpayer has the right of appeal to the Superior Court. The board has the right to add to the list of taxable persons or property, or subtract from it, but not the right to increase the valuation of any person without giving him the privilege of being heard. The board is prohibited from reducing the list of any resident of the State, unless he will voluntarily be sworn and answer all questions in regard to the list, or of any non-resident of the State, unless he or his agent will be sworn and answer questions. Appeals to the Board of Relief must be entered during the first twenty days of January. Appeals from the Board of Relief to the Superior Court may be taken within two months. By Section 2359, Revised Statutes (1902), the State Board of Equalization, consisting of the State Treasurer, Comptroller and Tax Commissioner, is authorized to equalize the assessments between towns, but as this provision is intended primarily to furnish a basis for levying State and county taxes, the board does not act, inasmuch as no State and county taxes are now laid. Under Section 2413, General Laws (1902), the Governor appoints a Tax Commissioner, with the approval of the Senate, term four years. This Commissioner is also a member of the State Board of Equalization. His duties are to visit the different towns and investigate their methods of assessing and collecting taxes. He has a large power of summoning witnesses, compelling testimony and the production of books and papers. He reports annually to the State Board of Equalization and bi-annually to the Governor. The theory is that of a general property tax, and that each item of property is assessed at its fair cash value. In theory the assessment of all property, real and personal, is annual. As a matter of fact, the real estate list undergoes a general revision rarely. Additions and omissions for cause are made each year, but so far as I can find out the last general revision of the real estate list was in 1901. There seems to be no legal maximum of taxation in New Haven. The constitution is an old one, and the Legislature doubtless considers that it has protected the taxpayer by the complex procedure cited above.

The annual city tax rates for the past five years have been as follows:

1902	12¾ mills.
1903	13¼ mills.
1904	13¼ mills.
1905	13¼ mills.
1906	14 mills.

Under the new charter, special act of June 20, 1899, and amendments thereof, the Mayor issues his warrant to the City Collector for the collection of all taxes. Taxes are a personal debt and are a lien against the real estate on which they are levied. By Section 6 of the City Charter, the City Collector is elected by popular vote on the first Monday of October for a two years' term (amendment of July 6, 1905). All taxes and money due the city are payable at the Collector's office. Until the current year taxes were payable July 1, with no penalty until after September 1. Beginning with 1906 taxes are due April 1st of each year, with penalty if not paid before August 1st.

By Section 33 the Collector must pay over to the City Treasurer before three o'clock each day the moneys collected by him in the twenty-four hours then ended. If taxes are not paid by August 1st, they bear interest at 9 per cent. annually from the time they became due. (Section 150, as amended June 21, 1905.) By Section 32 the Collector must report to the Assistant Corporation Counsel on the first Monday in September all taxes and assessments which have remained unpaid for a year, and the Assistant Corporation Counsel must proceed to collect them. By Section 2301, General Statutes of 1902, all collectors are to give reasonable notice of the time and place of receiving the taxes. The money when collected remains in the city treasury with the exception of the amount apportioned to the two small school districts (the Westville School District and the South School District), subject to be paid out on the warrant of the proper disbursing officers. The amount apportioned to these two small school districts is turned over to them. The present charter of New Haven is a highly consolidated one. The Collector collects all public moneys collected in the territory, and the City Treasurer is the custodian and disbursing officer of local funds for all purposes, except for the two small school districts referred to.

C 54. If water companies are taxed differently from other corporations and other property, state how and to what extent.

Indianapolis. Taxed the same as other domestic corporations, except railroads, freight lines, building and loan associations, and banks. (Act of 1901, Page 87, Section 4.)

New Haven. The company pays no taxes, except the general property tax. Water companies are not subject to the special corporation tax paid by several kinds of corporations in Connecticut.

C 55. What fees or licenses are paid to the State or local authorities?

Indianapolis. None.

New Haven. None, except for permits for opening streets, explained elsewhere.

C 56. Is the company subject to assessment for local improvements?

C 57. Are such assessments actually levied?

Indianapolis. The city of Indianapolis has for years relied upon special assessments for benefits for making most of her public street improvements. Under the new Municipal Act (1905, April 15), Sections 108 to 138, the city is authorized to levy special assessments for almost everything, from levees to lamp posts. The Indianapolis Water Company, according to the statement furnished me by the president and secretary of the company, has paid for the seven years ending with 1905, special assessments of $7,659.37.

New Haven. Under Sections 78 to 85 of its charter, the city, under the customary legal restrictions as to procedure and with the right of appeal to the court, may levy special assessments for laying out any square, park, street, highway, bridge, walk, removing snow, ice or sleet from the sidewalk, establishing any building line or discontinuing any highway, laying out and repairing sidewalks, curbs or gutters, and street sprinkling. I am informed by the officers of the company that it owns but little property other than part of one reservoir and its distributing system in New Haven, and that while its property is subject to special assessment the same as all other real property, no such assessments have been levied on it for many years.

D—FRANCHISES OF PRIVATE COMPANIES.

D 1. Does a municipality have power to grant franchises to water companies?

D 2. How was the power conferred?

Chicago. Yes, by the General City and Village Act, April 10, 1872; also Act of April 9, 1872.

Cleveland. Yes, by the general law, Section 45 Municipal Code and Section 3551 Revised Statutes. However, it is scarcely conceivable that a municipality owning its own water works would care to introduce a competing private company. So far as I can find out no city in Ohio has ever attempted to do so, but the city having specific authority to introduce a private water company and to contract with the same for the supply, and having the right even under certain limitations to permit competition between private water companies, reasoning from analogy I believe that the city might lawfully grant a private company the right to compete with its own works by the same method and procedure by which competition among private companies may be introduced. The law declares that a second company, when one company is in operation, may be introduced if the proposition is approved by popular vote.

Syracuse. Yes, Syracuse is a city of the second class, and by the general law applicable to such cities (Laws of 1898, Chapter 182), such power is granted. Originally this power was granted to Syracuse by special legislation as described under A 3.

Indianapolis. Yes, general law, April 15, 1905, Section 254.

New Haven. No.

D 3. State fully, step by step, the procedure which must be followed and the requirements which must be met in the initiation, consideration, enactment and renewal of franchises; also source of each provision, whether statute, city charter or ordinance.

Chicago. Under the General City and Village Act, April 10, 1872 (Starr & Curtis, edition of 1896, Chapter 24, Article 10, Paragraph 177, Volume 1, Page 786, Section 3): "The City Council or

Board of Trustees shall have power to make all needful rules and regulations concerning the use of water supplied by the water works of said city or village, and to do all acts and make such rules and regulations for the construction, completion, management or control of the water works and for the levying and collecting of any water taxes, rates or assessments as the said City Council or Board of Trustees may deem necessary or expedient." Under Paragraph 175, same act, Section 1: "The City Council shall have the power to authorize any person, or private corporation to maintain the same (water works) at such rates as may be fixed by ordinance and for a period not exceeding thirty years; also to prevent the unnecessary waste of water, to prevent the pollution of the water and injuries to such wells, pumps, cisterns, reservoirs or water works." For the carrying out of these plenary powers, there are no specific statutory requirements or regulations by ordinance. Under the General City and Village Act (*Starr & Curtis*, Chapter 24, Article 3, Page 42), all ordinances and all propositions to create any liabilities against the city or for the appropriation or expenditure of any of its money must be passed by a majority of all the members elected, on a yea and nay vote, and any one member may require the yeas and nays on any other proposition. Paragraph 48 requires a two-thirds yea and nay vote to pass an ordinance over the Mayor's veto. Paragraph 65: All ordinances making any appropriation shall, within one month after passage, be published and shall not take effect until ten days after so published. Paragraph 92 forbids the Council to make any contract or incur expense, "whether the object of the expenditure shall have been ordered by the City Council * * * or not, unless an appropriation shall have been previously made concerning such expense, except as herein otherwise expressly provided." Rules of Order of Business, City of Chicago (Edition 1897), Rule 42. A member desiring a yea and nay vote must call for it "previous to any vote on the question." By Rule 46, unless by unanimous consent, all ordinances and other matters brought before the Council shall be referred to the proper committee, "and only acted upon by the Council at a subsequent meeting on the report of the committee having the same in charge." By Rule 48, standing and select committees to whom matters are referred "shall, in all cases, report in writing at least once in each month, unless further time be granted by a vote of the Council, the state of facts with their opinion thereon." By Rule 49, committees are required to report some definite proposition or ordinance. Rule 50 requires that no order or resolution involving directly or indirectly the expenditure of money and no ordinance (except ordinances from the Department of Public Works for local improvements) shall be acted upon until published, "and then only finally acted upon at a subsequent meeting." Rule 52 permits the suspension of any and all these rules by two-thirds vote of the Aldermen present. A quorum of the Council consists of a majority of all the members elected.

Cleveland. Answered under B 8 and D 1.

Syracuse. Laws of 1898, Chapter 182, as amended, Laws of 1902, Chapter 177, and of 1904, Chapter 454, Section 19: Such grants are made by ordinance. No ordinance shall be passed on the day on which it is introduced, except by unanimous consent. No franchise ordinance shall be passed by less than three-fourths recorded yea and nay vote of all the members of the Council, and "the ordinance must provide for a disposition, under proper regulations for the protection of the city, at public auction, after public notice for at least three weeks, to the highest bidder."

The omission of any one of these steps makes the ordinance null and void. The ordinance must also be approved by the Board of Estimate and Apportionment. Franchises are limited to fifty years. Additional grants to companies already in operation may be made by the Council without advertisement and without sale to the highest bidder, and "upon such terms as the interests of the city may require." Such additional grants, however, require the approval of the Board of Estimate and Apportionment. All ordinances require the approval of the Mayor, unless passed over his veto by as large an affirmative vote as the original ordinance required for passage, and not less than three-fourths of all the members (Section 21). By Section 20, every ordinance, after it is passed by the Council, must, unless vetoed, receive the approval of the Mayor, be signed by the Clerk, and enrolled and promulgated according to law. If an ordinance imposes a penalty or forfeiture for the violation thereof, it shall be published at least three times each week for two successive weeks in the official newspapers of the city.

Indianapolis. Under the General Act of April 15, 1905, Sections 253 and 254, the city has the right to contract for the water supply, the contract to be drawn by the Board of Public Works. The Council has no power to amend or alter the contract, but must approve the contract by ordinance to make it binding. Such contracts cover both the private and public supply. The city is directed to make all necessary regulations and restrictions of the works and other property, and to provide for the terms on which water shall be supplied, "as well as for license fees or other reasonable compensation." Previous grants are specifically legalized. The term of water franchises is limited to twenty-five years, and the city is authorized to become a part owner by purchase or subscription of stock and to borrow money and issue bonds to pay for the same, the rate of such bonds not to exceed 6 per cent, and the bonds not to be sold below par. No period is fixed for such loans. By Section 93 (same act), Paragraph 9, the Department of Public Works, at least three months before the expiration of any such contract or franchise, shall advertise for bids in some newspaper of general circulation in the city, at least once a week for two successive weeks. The Board of Public Works (Section 91) is a bi-partisan or multi-partisan Board of three members appointed by the Mayor, and salaried. All votes which are not unanimous must be by yea and nay and be recorded. The meetings of the Board are public. Under the rules of procedure of the Common Council, adopted November 2, 1903, the regular meetings of the Board are held on the first and third Mondays of each month. The clerk must present each member with a printed copy of the proceedings within ten days after each meeting. Rule 2, Section 3: Ordinances when introduced are read by title, which must show the subject matter of the ordinance, then referred to the proper committee or considered in Committee of the Whole. No ordinance shall be passed the day it is introduced, except by unanimous consent. By Section 4, an ordinance must be read through at its second reading, the next question being on engrossment. After engrossment no amendments are permitted except by unanimous consent, save to strike out. All matters referred to committees must be reported out in writing not later than at the second regular meeting, unless otherwise ordered. A rule that no ordinance shall pass or be read the third time on the same day on which it was introduced, unless the rule be suspended by two-thirds vote, cannot be annulled or repealed by a majority vote. An ordinance so passed under a suspension by mere majority of such a rule is void. (Swindell vs. The State, 143 Ind. 153; The State vs. Swindell, 146 Ind. 527.)

Rule 4: Motions to reconsider can be made by one only who voted with the majority, but unless the motion to reconsider be made at the original meeting at which the vote was taken, notice of the intention to make it later must be given at that meeting.

By Rule 1, and also by Section 48, Act of 1905: Motions to adopt ordinances or to engross must receive a majority of the whole Council. By the same act, a two-thirds vote is defined as two-thirds of all the members elected to the Council. By Rule 2, Section 2, ordinances must be passed by roll-call and two members may ask the roll-call on any question. By the Municipal Act of 1905, Section 85, it is expressly provided that whereas contracts in general are prohibited before an appropriation is made for carrying them out, contracts for the public water supply are exempt from this provision. Section 53, Paragraph 30, expressly authorizes the Council to license and regulate the supply, distribution and consumption of water, and to fix by contract or franchise the prices thereof, and to regulate the laying of mains and pipes, and designate the streets and alleys through which the same shall be laid and maintained, and to compel the performance of contracts for the extension of such mains and pipes and the supply of water, upon any street. With unanimous consent, an ordinance may be passed on the day it is introduced provided two-thirds of the whole Council be present (Section 52, of the Act of April 15, 1905). By the same section, the Mayor has a general veto which may be overcome by two-thirds vote of the Council.

New Haven. Neither under the general laws, nor under the special charter of New Haven, has the city the right by any specific provision to grant a water franchise in the ordinary acceptation of the term. The New Haven Water Company, as explained elsewhere, gets its rights to lay pipe and furnish water in New Haven directly from the Legislature. It always appeals directly to the

Legislature for any modification of these rights, asking an amendment to its charter. As previously explained, the city has the mere police supervision and regulation of the operations of this company. By Section 133, Paragraph C of the Charter, the Council is given the right "to make, maintain and regulate public hydrants and to provide the same with water; to protect the same from injury, and to prevent an unnecessary waste of water." By Paragraph I of the same section, the Council is given the right "to regulate the laying of gas pipes, water pipes and drains for public or private purposes in the streets of said city." These are all the provisions bearing on the water supply, except that the Legislature, as fully explained elsewhere, has from time to time approved specific contracts, including the one now in force between the water company and the city. The above charter provisions and similar ones for other cities have been habitually construed by the Connecticut courts as giving the city the right to contract for the public water supply. (See opinion of Corporation Counsel Daggett, of January 2, 1903.) The stringent provisions of the charter on contracts in general (Charter, Section 156), especially exempt the contracts for furnishing light, water or telephone service; that is, do not require competitive bids and public advertisement on the ground that "the supplies or work needed can only be furnished by one party." (Opinion of Corporation Counsel Daggett, December 23, 1901.)

It seems, therefore, that the city, having no express legislative authority to make such contracts and making them under implied powers, has the greatest liberty in its method of procedure. According to general municipal law, any contract would have to be approved by the Board of Aldermen, subject to the rules of procedure of that Board, and the contract would probably be subject to the charter provision (Section 129) requiring that no by-law or ordinance should be passed until after it had been printed for examination, referred to a suitable committee, and reported after a public hearing. Other votes, resolutions and measures of the Council (except reports on special assessments) shall not be put on their passage except by unanimous consent, until reported on by a committee after a public hearing, and until the report of the committee has been twice read to the Board, and the second reading must be at least a week after the first. The printing may be dispensed with and second reading take place on the same day as the first, if the Mayor sends a special message to the Board declaring that immediate action is necessary. Every such vote, resolution or measure after the report by the committee shall be printed at the request of one-fifth of the members present, except when the Mayor, as explained above, asks immediate action. All ordinances must be published at least three times in every daily newspaper in the city, and shall not go into effect until one week after passage. By the rules of the Board, Section 10, one-fifth of the members present may call for a yea and nay vote. By Section 17, every member present must vote unless excused. By Section 20, a two-thirds vote is necessary to suspend a rule, and to amend or repeal a rule requires notice at the previous meeting and a majority of the whole Board. By Section 26, all orders or resolutions shall have two readings. By Section 30, committees must report on all matters referred to them within four weeks or ask for further time. By Section 31, no committee reports, except minority reports, will be received unless the members of the committee have actually met together to consider the matter.

D 3. *Give legal provisions with source of each, defining the powers of the city regarding the alienation of municipal franchises.*

Chicago. Starr & Curtis, Chapter 24, Article 5, Paragraph 42, requires a yea and nay vote, "provided it shall require two-thirds of all the aldermen elected to sell any city or school property." See also D 12. The forfeiture of a franchise under the clause permitting forfeiture for violation of contract requires judicial proceedings. (Foster vs. The City of Joliet, 27 Fed. Rep., 897.)

Cleveland. It has been decided that in the absence of restraining clauses the city may dispose of any property which it has the right to acquire. (Newark vs. Elliot, 5 O. S., 113; Reynolds vs. Stark, 5 Ohio, 204.)

By Section 9, Municipal Code, the city has the right "to sell or lease public property. By Section 22, Municipal Code, the city may "sell or lease any real estate or (to) sell any personal property belonging to the corporation when such real estate or personal property is not needed for any municipal purpose." I find no cases of the sale of water works, but in the case of Thompson vs. Nemeyer, 59 Ohio State, 486, it was decided that a city could sell its gas works under this clause.

By Section 24, Municipal Code, an ordinance for the sale of real estate requires a two-thirds vote and approval of the Board of Public Service. It must be advertised for five consecutive weeks and sold to the highest bidder. The Board may reject any or all bids, but in such a case must readvertise.

By Section 125, Municipal Code, "no ordinance or resolution granting a franchise or creating a right or involving the expenditure of money or the levying of any tax or for the purchase, lease, sale or transfer of property shall be passed unless the same shall have been read on three different days." This rule may be suspended by three-fourths vote. All ordinances require a yea and nay recorded vote, and a majority of all the members elected to the Council. (Kerlin Bros. vs. Toledo (1901), 8 N. P., 67.)

Syracuse. Answered under D 2.

Indianapolis. No special provision on this subject. The city may sell any of its real or personal property by vote of the Council, but no real estate may be sold except by two-thirds vote, and in any case if the property is worth more than $100 it must be appraised by three freeholders appointed by the Circuit Court. (Act of 1891, Section 53, Paragraph 56.)

New Haven. As explained under D 3, the city has no power over franchises.

D 5. Give legal provisions, with source of each, defining the powers of the city regarding methods of disposing of franchises.

Chicago. Answered under D 3.

Cleveland. Answered under D 4 and B 8.

Syracuse. Answered under D 3.

Indianapolis. Answered under D 4, except the ambiguous phrase requiring advertisement for bids cited under D 3, and found in the Act of 1905, Sec. 93, Par. 9. The paragraph is the one that authorizes the city to contract with any company or individual for the supply of water for public and private purposes, through the Department of Public Works, with the approval of the contract by the Council. The paragraph covers electricity, heat, gas, etc., and at the end has the proviso: "And provided further that the Department of Public Works, at least three months before the expiration of any such contract or contracts which are, or may hereafter be in force, shall by publication once each week for two successive weeks in a newspaper of general circulation in such city, give notice that it will receive bids for such supply" (of gas, steam or electric light, heat or power).

New Haven. Answered under D 4.

D 6. What are the legal provisions, with some of each, delimiting the powers of the city as to the insertion of clauses in franchises regarding streets to be utilized by company?

Chicago. Under the general acts of Apr. 9 and 10, 1872, cities are given full power to purchase or condemn land, erect and operate their own works, and to "authorize any person or private corporation to construct and maintain the same" for both public and private use, for a period not exceeding 30 years. Under the decisions of Illinois courts the city is left free to make such conditions as it sees fit, so long as it acts within this provision, and the company does not exceed its charter rights.

This answer covers all the following questions down to and including D 31.

Starr & Curtis (1896), Ch. 24, Art. 5, Par. 63 (13), gives the Council specific power to regulate the laying of water pipes.

Cleveland. The city has the right merely to regulate and control, but not to exact compensation. (2 N. P., 37, new series, 1904, The City of Columbus vs. The Columbus Gas Company.)

This case turns on the theory, which would apply equally to water companies, that although the city holds the fee of the streets, it holds the streets in trust for the use of all the people, and has no authority therein which it can lease, sell, or otherwise dispose of as a source of revenue. Such a grant is not a license for which payment may be required, and the right of the city to attach conditions to the grant rests entirely on the police power. If any sum of money can be exacted under such a grant, such payment must be considered as a repayment to the city of the cost of supervising the company.

Syracuse. Under the Laws of 1890, Ch. 566, Art. 7, being Ch. 40 of the general laws, as amended by the Laws of 1892, Ch. 617, the consent of the city is required to give entrance to a water company. By the Laws of 1898, Ch. 172, the City Council, with the approval of the Board of Estimate and Apportionment, has the right to grant franchises; and under Art. 5 of Ch. 182 of the Laws of 1898, the Commissioner of Public Works is placed in charge of the streets. It is plain from these provisions, as well as from the decision in 84 App. Div., N. Y., 71, Rochester and Lake Ontario Water Co. vs. City of Rochester, that the city has complete power in granting franchises to designate the streets to be used.

The same is true in regard to the matters contained in the three following questions, D 7, 8 and 9.

Indianapolis. The city has unlimited power in this particular. Act of 1905, Sec. 53, Par. 26, and Secs. 253 and 254.)

The same answer applies to questions D 7, 8, 9 and 10.

New Haven. Answered under D 4.

D 7. Ditto regarding nature of plant and equipment?

D 8. Ditto regarding construction of extensions?

D 9. Ditto regarding adoption of improvements and new processes?

Chicago. All three matters may be made the subject of contract ordinance.

Cleveland. Answered under D 6.

Syracuse. Answered under D 6.

Indianapolis. Answered under D 6.

New Haven. Answered under D 4.

D 10. Ditto regarding duration of grants?

Chicago. Thirty years. See answer to D 6.

Cleveland. Grants are unlimited, but the right of the city to contract for supply of service is limited to 10 years. (Sec. 45 of the Municipal Code.)

Syracuse. Grants limited to 50 years. (Laws of 1898, Ch. 182, Sec. 19.)

Indianapolis. Limited to 25 years. (Acts of 1905, Sec. 254.)

New Haven. Answered under D 4.

D 11. Ditto regarding forfeiture of franchises?

Chicago. Forfeiture under the contract ordinance requires judicial proceedings, and cannot be effected by mere ordinance. (See answer to D 4.)

Cleveland. In the absence of express legislative provisions the forfeiture of the franchise can only be established by judicial action, and cannot be inquired into collaterally (Bank vs. Renick, 15 O., 322). The above case refers to the corporate franchise, and not to the relations of the company to the city. The Ohio law makes a sharp distinction between the right of a corporation to occupy the streets, which is subject alone to police power regulation of the city, and a contract between the city and the company for the supply of service. Such a contract may contain any conditions mutually agreeable to the parties, and not in conflict with the statutes.

Syracuse. The statutes cited in the answer to D 6 leave the matters covered under D 11, 12 and 13 at the discretion of the city. The charter of the only company that ever furnished water in Syracuse (Act of Apr. 15, 1849), the Syracuse Water Company, made special provisions for such forfeiture, and for the city's taking over the company and operating it, in case of forfeiture.

Indianapolis. The matter is not mentioned in the statute, but it is plain from the sweeping character of the language (Sec. 253, Act of 1905), that the city can provide for forfeiture in a contract ordinance. Even under the old law, which was much less sweeping, such a provision is made by the ordinance of Jan. 3, 1870, amended by ordinance of Jan. 24, 1870.

The terms on which the city can buy the Indianapolis Water Company are determined by its charter, and confirmed by contract ordinance, before explained.

New Haven. This matter is provided for in the perpetual contract signed Feb. 17, 1902, and confirmed by the Legislature in 1903. Sec. 14 of the contract provides specifically that the contract shall not be voided except in accordance with the specific provisions of the contract itself.

The general character of this contract is explained in a supplementary report on this company.

D 12. Ditto regarding time, method and terms of acquisition of plant by city?

Chicago. It is customary for cities in Illinois to provide for purchase of a plant. In addition to the foregoing statutes, a general act of Apr. 22, 1899, explained more fully elsewhere, gives the city the right to construct or purchase, and provides means therefor. The Act of June 19, 1893, amended by Act of Apr. 24, 1899, authorizes the purchase or lease of existing works, and fixes the mode of acquiring works under these acts. The Act of Apr. 19, 1899, authorizes either the purchase or construction of water works, and the levying and pledging of a tax therefor and the operation of the works thereafter. The Act of Apr. 19, 1899, is still further amended by the Act of May 18, 1905.

Cleveland. The city, under powers previously noted, having the right to establish its own works when there are no private works, or in competition with the private works, and to regulate the price of water furnished (R. S. 2474), the law evidently contemplates that the plant of a private company shall not be purchased save by voluntary sale. It is doubtful, therefore, how far conditions of sale can be introduced into a franchise grant.

See also the answer to D 6.

Syracuse. Answered under D 11.

Indianapolis. Under the Act of 1905, Sec. 249, the city may purchase, lease or erect water works by first submitting the question by order of the Council to a popular vote, if the vote be favorable to the proposition. An ordinance must then be passed approving such a contract or resolution. The city may pay for such works by the issue of bonds, denominations of from $50 to $1,000, period not less than five nor more than thirty years, rate not above 6 per cent., not to be sold below par; "and such city or town may from time to time negotiate and sell so many of such bonds as may be necessary for any such purposes." By Sec. 251, to meet the principal and interest of such bonds, the city may levy an annual tax of 20c. on the hundred dollars, and of $1 on each poll. These taxes are in addition to the general tax levy for city purposes, which is limited to 90c. in cities of the first class. Art. 13, Par. 1 of the Constitution (1851) limits municipal indebtedness to 2 per cent. of the tangible property.

New Haven. This matter is provided for in the contract.

D 13. Ditto regarding disposition of plant thus acquired?

Chicago. Under the statutes cited above the city has full power to operate. Under the Act of Apr. 10, 1872 (Starr & Curtis, Ch. 24, Art. 5, Par. 42), a two-thirds vote of the Aldermen is required to sell any city or school property. Under an Act of March 22, 1889, a city may sell any real or personal property by ordinance by a three-fourths vote, but before the sale the ordinance must be published in a daily or weekly paper of the city, if such there be, for 30 days, and if there be no such paper in the city, it must be published in a paper of general circulation in the nearest city. The ordinance must set forth at what meeting the bids will be opened (they must be opened at a regular meeting). The bids must be advertised for 30 days. It requires a three-fourths vote to accept a bid, while a majority vote may reject any bid.

Cleveland. Under the powers previously explained, the city has full power to operate its plant irrespective of the time and manner of acquiring it.

Syracuse. Answered under D 11.

Indianapolis. The city has full power to operate through its Board of Public Works (Act of 1905, Sec. 252). By act approved March 6, 1905, any city or town, whether under a general or special charter, may sell its water works or other public utilities in the following manner, and upon the following conditions: First, the sale must not be made at less than the appraised value, to be fixed by three disinterested freeholders, residents of the county but nonresidents of the city or town, appointed by the Judge of the Circuit Court. The ordinance or resolution providing for the sale, decluding in full the proposed contract of sale, shall be published in a newspaper of general circulation at least thirty days before the sale. Upon the petition of 100 freeholders and resident taxpayers within these thirty days, the question of sale must be submitted to the qualified voters. The sale is to be carried out if the proposition have a majority of the votes cast on this subject at a general or special election. If there be a newspaper published in the place, notice of such election shall be given in two successive weekly issues. Otherwise, notices must be posted for at least 15 days. The notices must inform the voters where they can obtain free printed copies of the ordinance. If the vote is at a regular election, this proposition must be placed on the official ballot. At a special election for this purpose the ballots must be printed by the City or Town Clerk in such a form that the voter may vote yes or no. The proceeds of such sale go into the general fund.

New Haven. No provisions.

The same answer applies to D 14, 15 and 16 following.

D 14. Ditto regarding consent of abutting property owners to use of streets?

Chicago. No consent required.

Cleveland. No consent required. Street-car franchises are subject to entirely different legislation, and require the consent of abutting property owners. (Municipal Code, Sec. 30.)

Syracuse. No consent required.

Indianapolis. No consent required.

New Haven. No consent required.

D 15. Ditto regarding period within which construction must be begun?

Chicago. May be regulated by contract under general power.

Cleveland. Cities are permitted to make police power conditions only for permitting the company to do business in the city. In making contracts for service they can fix such conditions as are not contrary to law. Sec. 3550 of Revised Statutes: "A company organized for the purposes of supplying * * * the inhabitants of a city * * * with water, may sell and furnish any quantity of water for such or other purposes, and such companies may lay conductors * * * for conducting water through the streets, alleys, lanes and squares in such city, with the consent of the municipal authorities of the city * * * and under such reasonable regulations as they (the city) may prescribe." The regulation referred to may be such only as to protect the public and reimburse the city for expenses of inspection. (Columbus vs. Columbus Gas Co., 2 N. P. (Ohio), new series, 37.)

Syracuse. The city has full power in this matter.

Indianapolis. Matters referred to under this and the following question, D 16, are not specifically mentioned, but under the general laws they may clearly be dealt with by contract ordinance.

New Haven. This and the following question, D 16, do not apply to the City of New Haven, which does not grant franchises.

D 16. Ditto regarding period within which the plant must be completed?

Chicago. May be regulated by contract under general law.

Cleveland, Syracuse, Indianapolis and *New Haven.* Answered under D 15.

D 17. Ditto regarding monopoly rights or competitive plants furnishing the same or competing services?

Chicago. Under the general powers the city may bind itself not to compete and not to authorize competition, but cannot divest itself of its power to regulate rates.

Cleveland. The decisions in Ohio are uniformly against the power of the city to grant monopoly privileges. (State vs. Hamilton, 47 O. S., 52.) An ordinance granting an exclusive privilege is void—Hamilton vs. Gas Co., 8 N. P. (Ohio), 519; also the State vs. Cincinnati Gas Light & Coke Co., 18 O. S., 262.

Syracuse. The city has no right to grant monopoly privileges to a water company—Syllabus to Syracuse Water Co. vs. City of Syracuse, 2 cases, 116 N. Y., 167: "The municipal corporation could bind itself by such contracts only as it was authorized by statute to make. It has no power to grant exclusive privileges to put mains, pipes and hydrants in its streets, nor can it lawfully by contract deny to itself the right to exercise the legislative powers vested in its Common Council."

Indianapolis. The city is prohibited from granting an exclusive franchise for water. In granting the franchise to the present company it expressly reserved the right "to construct and operate works for itself, or to charter another company to construct and operate works in said city." (Ordinances of Indianapolis, 1904, Sec. 4021.)

Citizens Gas & Mining Co. vs. The Town of Elwood, 114 Ind., 338 (1888): "We very much doubt * * * whether the Legislature could, even if it so desired, grant exclusive privileges to any corporation, but we have no such question before us, for it is very clear to our minds that the Legislature did not intend to authorize municipal corporations to make special grants." See also Crowder vs. Town of Sullivan, 128 Ind., 486.

New Haven. The city is compelled, under the present contract, to take water from the company; save that the city has the right to drive wells for supplying parks, etc., but not to distribute water through mains for either public or private use.

D 18. Ditto regarding rates to be charged?

Chicago. The city has the right to fix just and reasonable rates for charges (Gen. Statute, June 6, 1891). The question of reasonableness is subject to review by the Circuit Court of the district in which the city is situated. It would seem by the decisions of the courts that the city cannot by contract divest itself of its right to regulate. (Cain vs. City of Wyoming, 104 App. (Ill.), 543; also the Rogers Park Water Co. vs. Fergus, 178 Ill., 571. The same case, 180 U. S., 624.)

Cleveland. By Sec. 2478 of the Revised Statutes, the city is given the right to regulate the price for both public and private use by ordinance; also to fix the meter rent. By Sec. 45 of the Municipal Code, the city may enter into a ten-year contract with a company for furnishing water for public use.

Syracuse. Under the statutes cited in the answer to D 6, the city doubtless has complete power over the matters referred to in questions D 18, 19, 20.

Indianapolis. The rates are at the discretion of the city, except that by Sec. 139 of the Act of 1905 the city is forbidden to make any charge for water from publicly owned works for extinguishing fires, for supplying and furnishing connections for fire purposes, for the cleaning of market houses or streets, and for the use of public buildings, parks and other grounds belonging to the city, for the flushing out of sewers, or for other sanitary purposes. Under the Municipal Act of Apr. 15, 1905, Sec. 93, Par. 9, the Board of Public Works is authorized to contract with any person or company for the supply of water for public and private uses, and "to fix the terms and the conditions and the prices to be charged for the same."

New Haven. The matter is covered by Article 5 of the present contract, but as explained in a supplementary report, the contract provision is meaningless. Apart from this clause, the city has no right to regulate prices, and the State has, in fact, never attempted to do so, except to confirm the specific provision on prices in the contracts of 1892 and 1902. (See opinion of Corporation Counsel Daggett, Feb. 13, 1902.)

D 19. Ditto regarding character and quality of service?

D 20. Ditto regarding right of city to regulate operation?

Chicago. Both matters proper subjects of contract.

Cleveland. The city can act in these matters only within the police power.

Syracuse. Answered under D 18.

Indianapolis. The city by contract ordinance has virtually unlimited power to regulate the quality of the service and the operation of a private water plant. The city is equally free in regard to a publicly owned plant, except as regards the strictly financial operations of the public plant.

New Haven. The city has no power apart from the contract. Paragraph 6 of the contract is as follows: "Said company agrees to use all reasonable efforts to supply the city and its inhabitants with pure and wholesome water, it being understood that plans for the filtration of the Lake Whitney supply are now under consideration by the company." The Lake Whitney supply is now (August, 1906) filtered.

D 21. Ditto regarding taxation?

Chicago. Taxation is so restricted by the constitution that the city has no power over it in this connection.

Cleveland. Entirely outside the powers of the city.

Syracuse. Constitutional and statutory provisions on the point are very meagre. The matter has not been judicially determined. I think it plain, however, that in so much as the subject of taxation rests on laws distinct from the city charter, which make all property not exempt by the statute liable to taxation, the city would have no right to exempt a company or any of its property from taxation. It is not impossible that for a fair equivalent the city might agree to hold the company harmless for any or all taxes. It is not likely, however, that the powers granted the city by the Legislature over the streets would enable the city to exact a franchise tax, compensation for franchise, the paving of streets, or anything else that the court would view as a compensation, direct or indirect, for the use of the streets. Under present legislation the power of the city is limited to a reasonable regulation with a view to protect the interests of the city.

Indianapolis. The constitution of Indiana, Sec. 193, requires taxation to be uniform and equal, with assessment for taxation of all property, except such as is especially exempted by statute, because used for municipal, educational, literary, scientific, or charitable purposes. Under the general tax laws (Acts of 1891, P. 199, Sec. 3), "all property within the jurisdiction of this State not expressly exempted shall be subject to taxation." This clause prohibits the city from granting an exemption to taxation by franchise or contract.

New Haven. The company, under the contract (approved by the Legislature) is partially exempt. The city gets free water for public use (Sec. 10), but in case any other than property taxes are ever laid on the company, the city has the option of bearing the burden of such taxes for the company, or of paying for water for fire protection, $20 per hydrant; and for other purposes, the lowest meter rate less 25 per cent.

D 22. Ditto regarding compensation for franchises, including all free services?

Chicago. I have no doubt that under the general power of the city it could exact compensation, and contract for free services.

This answer applies also to D 23 and 24.

Cleveland. Compensation is prohibited. The city has no right to demand free service in lieu of compensation.

Syracuse. Answered under D 21.

Indianapolis. Under Sec. 252, Act of 1905, the city is given a free hand to deal in its franchise grants with free services. "In granting such franchises, such city or town shall also provide for the terms on which such water, gas, steam, electricity, or other element, and such drainage and sewerage connections shall be supplied to the city or town and to its inhabitants, as well as for reasonable license fees or other compensation to be paid to such city or town for any such franchise and privilege."

New Haven. The city has no right to demand payment for the franchise, and the State has not chosen to do so. Free services are dealt with in the supplementary report.

D 23. Ditto regarding paving of streets?

D 24. Ditto regarding removal of mains from streets?

Chicago. Answered under D 22.

Cleveland. As a police regulation the company may be made to bear the expense of putting the streets in order, but no burden or condition which is in essence compensation for the use of the streets can be required. The company may lay pipes under reasonable regulations (Sec. 3550, R. S.). In so much as street franchises are granted without time limit, it would appear that the city has no right to require the removal of the mains. By ordinance of Dec. 10, 1904, the City of Cleveland permitted the American Steel and Wire Company to lay pipes from the lake to its own works for furnishing water exclusively for its own use, and fixed very severe conditions for laying the pipes, and reserved the right to have the pipes removed from the streets at the expense of the company at any time, but such conditions, apparently, could not be imposed upon a water company.

Syracuse. See answer to D 21. No specific provisions in regard to removal of mains. It would appear doubtful if such a stipulation could be brought under the term "reasonable regulation," as the pipes would do no harm in the streets. The city has the right to lay its own pipes, or to authorize another company to lay pipes, to meet the needs of the city.

Indianapolis. While paving is not mentioned, it is plain that the language of Sec. 253, cited in part in the answer to D 22, might be made to cover paving. The same theory applies to removal of street mains.

New Haven. The city has no power in these matters. The company's charter requires it to put the streets in order when it opens them.

D 25. Ditto regarding issuance of stocks and bonds?

Chicago. This matter is regulated by the general incorporation law. Probably beyond the power of the city. (See answer to D 25 for Indianapolis.)

Cleveland and *Syracuse.* Probably beyond the powers of the city.

Indianapolis. The question raises a doubtful legal point. It is probable that the city by contract with the company, under Sec. 253, Act of 1905, might limit the company in these matters, so long as such contract did not in fact limit the ability of the company to perform any of its public duties.

New Haven. Beyond the power of the city.

D 26. Ditto regarding examination of records?

D 27. Ditto regarding audit of accounts?

D 28. Ditto regarding publication of reports?

Chicago. The matters referred to in D 26, 27 and 28 may clearly be made the subject of contract by the city. In practice these matters are not covered by contracts.

Cleveland. No such powers. Probably such provisions might be inserted in a contract with the company for the supply of water, but not in the franchise or grant to use the streets.

Syracuse. Never ruled on by the courts. Apparently such a provision would be construed as a reasonable regulation. Under the charter of the only water company ever operating in Syracuse, the company's records were open to inspection.

Indianapolis. Under Sec. 253 (Act of 1905), the city clearly has the right to contract on these matters so long as the terms of such contract are within the charter powers of the public service corporation concerned, and do not violate the general laws. The matter is not dealt with in the general municipal corporation act, save in the broad and sweeping language of this section.

New Haven. These matters are beyond the power of the city. See answer to C 39.

D 29. Ditto regarding returns to public authorities?

Chicago. See answer to D 26. By Act of May 10, 1901, every corporation must make an annual report to the Secretary of State within the month of February, and pay a fee of $1 for filing the same. The report is not required to contain information of value. The act probably originated in an attempt to enforce the tax and anti-trust laws.

Cleveland. See answer to D 26.

Syracuse and *Indianapolis.* See answer to D 26.

New Haven. See answer to C 39.

D 30. Ditto regarding transfer of franchise to third parties?

Chicago. Answered under D 25.

Cleveland. Beyond the power of the city, but such a company under the State law may consolidate with and thereby transfer its franchise to any electric lighting company, natural or artificial gas company, coke company or water company doing business or incorporated and organized for the purpose of doing business in the same municipal corporation, in the manner provided for the consolidation of railroad companies.

Syracuse. Answered under D 25. However, under the old legislation provisions were inserted in the franchise granted March 23, 1886. This franchise never went into operation, but apparently no one suggested at the time that this provision was illegal or improper. In so much as the laws of New York authorize under certain conditions the sale of the property rights and franchises of one corporation to another (R. C. Harrison, The New York Corporation Law, 1906, Page 311, Article 2, Paragraphs 32 and 33, and Classified Corporation Laws of all the States, M. U. Overland, Page 287, edition of 1906), it would seem probable that the city might bind the company by franchise contract not to exercise such rights.

Indianapolis. Answered under D 26.

New Haven. Section 12 of the contract gives the city the right to purchase the property of the company in accordance with Section 8 of the contract if the company sells its property or franchises, becomes a member of a trust or syndicate, or at any time has a Board of Directors, a majority of whom are not residents of New Haven.

D 31. Ditto regarding labor clauses?

Chicago. Answered under D 26.

Cleveland. Answered under D 26.

Syracuse. It is doubtful if the courts would uphold any clauses not specifically authorized by statute.

Indianapolis. Answered under D 26.

New Haven. The city has no power in the matter under the statute, and the subject is not touched upon in the contract.

D 32. Ditto regarding other important matters, including renewal of franchises?

Chicago. Answered under D 26.

Cleveland. So far as I understand the jurisprudence of Ohio the theory is that the city cannot fix terms and conditions in a water franchise grant (transportation companies are under a different code). In theory franchises are unlimited in time and companies are subject to competition either by the city or other private companies, and the city has the right to purchase the property by voluntary agreement; to make 10-year contracts for the supply of water for public use, and in the absence of contract has the right to regulate the price for both public and private use at any time.

Syracuse. Such franchises are limited under the Laws of 1898, Chapter 182, to 50 years. The last part of Section 19, Chapter 182, Laws of 1898, reads as follows: "No such franchise shall be granted or be operated for a period longer than 50 years. The Common Council may, however, grant to the owner or lessees of an existing franchise under which operations are being actually carried on, such additional rights or extensions in the street or streets in which the said franchise now exists, upon such terms as the interests of the city may require, with or without sale or advertisement, as said Common Council may determine; provided, however. that no such grant shall be operated unless subsequently approved by resolution of the Board of Estimate and Apportionment, and also by the Mayor." This clause certainly gives very wide power to the city government to make terms and conditions in granting additional rights to a company in operation, especially where the company has the right to operate in every street in the city, but the clause still leaves the matter in doubt as to an actual renewal or extension of the franchise beyond the period of 50 years. On the whole, I think it probable that stipulations determining the conditions of renewal at the end of 50 years are not permissible in original grants.

Indianapolis. The renewal of franchises is to be dealt with apparently as the granting of a new franchise and subject to the same limitations except as covered by the vague language on advertising for bids (Act of 1905, Section 93, Paragraph 9), cited in answer to question D 5.

New Haven. I trust that I have already made it plain that the city has no power over franchises, and that the whole relation of the city to the company is that of the general police power of regulating the operations of the company, which has a perpetual franchise from the State. The only other relations of the city to the company are determined by the existing perpetual contract, signed February 17, 1902, and confirmed by special legislative act in 1903.

D 33. What remedies, penalties and means of enforcing the above provisions have been provided?

D 34. Are they effective?

Chicago. There is really nothing to enforce as the city is left free to do exactly as it pleases without State supervision. Its only means of enforcing its contract rights, as in the case of the Rogers Park private company, is resort to the courts or appeal to the State to forfeit the charter by judicial process.

Cleveland. Question does not apply. The city enforces its police regulations against the company in the same manner that it exercises its police powers toward others.

Syracuse. The question does not apply as no company has rights in the city.

Indianapolis. Nearly all the above provisions are found in the General Municipal Law of April 15, 1905. The Indianapolis Water Company, the subject of this report, is acting under a general charter granted in 1865, amended in 1881, and under a contract ordinance made with the city in 1901, before the present legislation was passed. The provisions of the charter and the ordinance under which the company is acting are fully set forth elsewhere in this report. It may be incidentally remarked, however, that although the legislation of 1905 is supposed to be a complete revision of the laws relating to municipalities, the provisions of the Act of 1905 are not widely different, so far as the matters touched on in this report are concerned, from the previous legislation which was very favorable to the municipality and opened the gates very wide for either public ownership or for the control of the water company by contract. Sections 16 and 17 of the present contract (1901) between the city and the company, approved August 19, call for good potable water, to be determined by two chemists selected, one by the company and one by the city, and with the right to appoint a third in case the two disagree. The franchise of January 3, 1870, Section 1, called for "pure, filtered and wholesome water." Analysis of the water is to be made whenever the Board of Public Works and the Board of Public Health and Charities shall require it. The city took no effective steps to determine the character of the water or enforce these provisions of the contract until the unprecedented flood of March 9, 1904, brought widespread sickness, general alarm and great public agitation for improvement of the water supply. This resulted in the elaborate investigation of the joint commission, composed of George W. Fuller, C. E. Ferguson and B. J. T. Jeup, report made in print (46 pages, October 26, 1904). This investigation included every phase of the water supply, including the sources and a chemical and bacterial analysis. The commission made 16 specific recommendations (pages 35 and 36), which so far as they seem significant have since been carried out. The city has also, since this report was made, undertaken, through its Health Department to make daily analyses of the water on its own account. This had not been done before. The contract with the company seems adequate to protect the public interest save only the question of price to private consumers, and since the agitation of 1904 and 1905 seems to be well enforced.

New Haven. Determined wholly by the contract, which is dealt with in a supplementary report. Section 362 of the city ordinances authorizes the Board of Aldermen to appoint one or more inspectors of water meters, with authority to inspect and test meters on application of users, provided that 48 hours' notice be given to the company. Apparently the users are to pay for the inspection, and the tariff to be fixed by the Board of Aldermen. In regard to this clause, the City Clerk says: "Very few meters are in use in New Haven, and so far as I am able to learn no inspectors have been appointed or asked for." The remedies have never been tried. They appear on their face to be ineffective.

D 35. If defective in any regard and the provisions are not enforced, state in what respects, and give reasons.

Chicago. See answer under B 12. The question does not apply to local conditions except as regards the franchise of the Rogers Park Water Company. Under this contract (with the Rogers Park Company) two important legal cases have been pressed to courts of last resort, and another is now pending. In the first, John B. Fergus vs. The Rogers Park Water Company, was involved the question of the right of the City of Chicago to regulate the rates for the use of water in the face of a thirty years' contract, dating from November 12, 1888, attempting to fix the rates for the whole period. The court upheld the right of the city to regulate the rates, notwithstanding the contract. The original contract of this company was made by the Village of Rogers Park, at that time an independent municipality, to whose rights and obligations the City of Chicago succeeded on April 4, 1893, when Rogers Park was annexed to Chicago. The second case, that of the Rogers Park Water Company vs. The City of Chicago, was one in which the company contested the particular rate for water fixed by the City of Chicago. This involving no federal question, was carried to the Supreme Court of Illinois, and decided in favor of the company on the ground that the particular rate, which was the same as that charged in the other portions of Chicago, was unreasonably low. On June 12, 1905, the Rogers Park Water Company filed a bill with the Circuit Court of Cook County to restrain the City of Chicago from entering with its water pipes the territory of the Rogers Park Company and from the levying of a special assessment for such water pipes, the company claiming an exclusive privilege for that territory under the original contract ordinance of November 17, 1888. The case is now pending in the Appellate Court of Illinois. Since this report was written (about August, 1906), the Mayor of Chicago, through his police force, took violent possession of the Rogers Park Water Company, stopped the pumps of the company, connected the pipes of that company with the pumps of the Chicago Water Works, and has since been furnishing water from the public pumping stations of Chicago through the distributing system of the Rogers Park Company. This high handed proceeding was taken on the avowed ground that the water furnished by the Rogers Park company was so unsanitary that a great epidemic of disease was threatened in that territory. As explained elsewhere, under the franchise of that company the city had the right to purchase. The company will doubtless press its suits for damages for the violent taking by the city.

Cleveland. ————

Syracuse. Answered under D 33.

Indianapolis. The chief difficulty since 1905 with the water situation at Indianapolis, does not seem to be with the charter of the water company, or with the legal powers of the city over the company, or with the contract between the city and the company, or even with the machinery or methods of enforcing the contract, but with the 28,000 polluted surface wells still in use in the city, according to the report of the Joint Commission, October 26, 1904, pages 31 to 32. Although the Board of Health has officially condemned many of these wells in the last eight years, there is no evidence that such condemned wells have gone out of use. The exact extent of the powers of the city, under present law, to compel the discontinuance of the use of the wells is in doubt. Paragraph 7, Section 53, Act of 1905, gives the Council power "to declare what shall constitute a nuisance, to prevent the same, to require its abatement, authorize the removal of the same by the proper officers, and to provide for the punishment of the person or persons causing or suffering the same." This act, with sections 213 and 214, defining the powers of the Department of Health and Charities, may possibly give the city sufficient power to prevent the use of these wells. However that may be, the great number of voters using the wells, together with large real estate interests, have been able so far to bring sufficient political pressure on the Council to prevent the passage of any ordinance compelling the discontinuance of the wells in question, and the connecting of the property on which the wells are situated with the city water works.

New Haven. ———.

D 36. Give complete list of all water franchises now in force.

Chicago. The only water franchise in Chicago is that of the Rogers Park Water Company, granted November 12, 1888, by the Village of Rogers Park, for thirty years, in form exclusive (the matter is now in litigation), for the then territory of the Village of Rogers Park, about one and a half square miles on the lake shore, now the northeast portion of the City of Chicago.

Mileage of mains of the company, December, 1904, 22.264. A manuscript report of T. C. Phillips, Engineer of Water Pipe Extension (of Chicago), February 26, 1906, says that there are 23.3 miles, of which nearly 80 per cent. is six inch, the remainder nearly equally divided between four, eight and ten inch. The whole property of the Rogers Park plant is estimated by the Engineering Department of Chicago at about $234,000. This includes, however, more than $22,000 for pavement which has been put down since mains were laid. The Chief Engineer objects decidedly to this item.

Cleveland. No franchises.

Syracuse. No franchises.

Indianapolis. The only water franchise in Indianapolis is that of the Indianapolis Water Company, granted January 3, 1870, amended by contract of August 19, 1901, for the City of Indianapolis, by implication for fifty years. As no period is mentioned in the franchise, the franchise probably runs for the life of the corporation, which is fifty years from the date of incorporation, October, 1869. The franchise is specifically competitive, and applies to all the streets of Indianapolis. This apparently means the streets of any territory annexed to the city. The dangers from perpetual franchises were supposed to be obviated by the express provision that the city reserved the right either to grant a franchise to any other company or to build its own water works, which at that time, under the statute, it had the right to do, and also by the provision that the prices for both public and private use should in no case be higher than the average price in the United States for water from as efficient works, and should be subject within these limitations to adjustment as often as once a year by either agreement or arbitration, at the request of either party to the contract. It was expressly provided that under no circumstances should the prices be higher than those mentioned above, and in the case of the hydrant rental, in no case should that exceed $50 per hydrant per annum; and the further safeguard was provided that the city might purchase the property and franchise of the company on six months notice at any time by voluntary agreement, or in case of disagreement at a price to be fixed by a joint board of five disinterested non-residents. The city even reserved the right to refuse to buy after such Board of Arbitration had been appointed, and had made its report. In any case no value was to be placed on the franchise. The company was forbidden to sell to any person or corporation, except the city, without giving the city the option of buying on the same terms offered to others. The purchase contract was further made subject to approval by popular vote.

New Haven. The only water franchise in New Haven is that of the New Haven Water Company, granted by the Legislature in the charter of the company, special act, 1849, and amendments thereto.

See also answer to C 7, C 9, and A 14. The charter is perpetual, with option of purchase. It is, however, highly doubtful if the act under which the method of purchase is provided, that of 1881, is now in force. (See opinion of Corporation Counsel, February 17, 1902, City Year Book, 1901, Page 574). Be that as it may, the act is inadequate, and the city could not purchase without additional powers from the Legislature. The franchise is not exclusive in form, but under contract and the stipulation, both of February 17, 1902, it is doubtful if the city could either compete or authorize any one else to compete. The city certainly must take public water from this company, and cannot itself distribute water through mains to private consumers. The franchise covers all the streets of New Haven as well as the other towns mentioned under C 9. The street mileage of the city is substantially two hundred miles.

D 37. Following the designation used in the preceding question, state for each franchise the conditions upon which franchise may be declared forfeited.

Chicago (Rogers Park). Forfeiture for failure to supply quality or quantity of water called for for one year, and after notice from the village that either the quality or the quantity is not in accordance with the ordinance.

Cleveland. Questions D 37 to D 60 inclusive, do not apply to the conditions in Cleveland, where there are no water franchises.

Syracuse. Questions D 37 to D 58 inclusive, do not apply to conditions in Syracuse as there are no water franchises in force.

Indianapolis. By the original ordinance, January 5, 1870, construction was to begin in 90 days, five miles of pipe to be laid and connected with the works within a year, and in twenty-seven months fifteen miles of pipe were to be laid. The franchise was to be forfeited if by lack of care or diligence the company failed to fulfill these requirements, or, having fulfilled them, should fail to furnish water for 36 consecutive hours at the rates provided in the ordinance. The city reserved the option of declaring forfeited, instead, all the hydrant rentals for one year. Nothing was said in this ordinance about how the fact of forfeiture should be determined. By the amended ordinance of January 24, 1870, this matter was cleared up by the provision that no forfeiture of the franchise or hydrant rental should take place except by judicial declaration by a court of competent jurisdiction. This was probably the law under the original ordinance.

New Haven. Not the franchise, but the contract with the company can be annulled, or forfeited, only in the manner provided in the contract itself. By Paragraph 2, if the works become inadequate and the company shall not "use all reasonable means to restore said works to a proper state of efficiency," the contract becomes liable to annullment. This clause would naturally require judicial determination. By Section 8, in case of a failure of the company to fulfill its contract in respect to the supply or quality of water for public or private use (the contract does not require the company to lay any pipes), the city has the right to purchase the works and franchises of the company in the manner provided for in the Act of 1881 (which apparently and according to the allegations of the officers of the company is no longer in force), at a fair valuation, including the value of the franchise, determined by appraisers appointed by the court. The clause also applies in case the company refuses to abide by the price fixed by arbitration (Section 5). Such failure of the company, however, must be judicially determined, and the city must "commence to take steps for such purchase within four months from such judicial determination or refusal." By Section 9 the method of proceeding for annulling the contract is set forth. By Section 11 the city is given the right to purchase the property and rights of the company at the end of 25 years from February 20, 1902, and at the end of any succeeding period of 25 years, at a fair valuation, to be determined in the manner provided for in the Act of 1881. Under Section 12, if the company transfer its franchise, have a Board of Directors, the majority of which do not reside in New Haven, or if the company become a member of a trust or syndicate, the city has the right to purchase in the manner provided for in Section 8. Section 14 expressly declares that notwithstanding any breach of the contract neither party has the right to annul or set it aside, except in accordance with the terms of the contract as I have just explained them.

D 38. In like manner, state for each the time, method and terms of acquisition by the city.

Chicago (*Rogers Park*). Section 8 gives the city the right to purchase after 10 years, and at the expiration of any five years thereafter, with six months' previous notice; value to be fixed by arbitration of three persons. Payment for franchise expressly provided for. Payment to be made within 60 days after the award.

Cleveland. See D 37.

Syracuse. See D 37.

Indianapolis. The city has the right to purchase at any time on six months' notice at a price—if a voluntary agreement cannot be reached—to be determined by a joint board of arbitration of five non-residents. The city has the right to reject the purchase after the arbitration. The company is forbidden to sell to anybody except the city without first giving the city the option to purchase at the same price. Any purchase, including the terms of purchase, must be ratified by popular vote, and no value is to be placed upon the city franchise of the company. (Section 7 of the ordinance of January 3, 1870, confirmed by Section 15 of the contract, signed December 31, 1900, approved by ordinance August 19, 1901.)

New Haven. Answered under D 37.

D 39. In like manner, state for each the method by which the plant thus acquired may be utilized.

Chicago (Rogers Park). Under the General Act of April 10, 1872, the city has full authority to operate and is not even required to pass an ordinance authorizing operation. (Springfield vs. The People, 137 Ill., 660.)

Cleveland and *Syracuse.* Answered under D 37.

Indianapolis. Answered under D 13.

New Haven. No provisions. The power to purchase, however, probably implies the power to operate, sell or lease.

D 40. In like manner, state for each whether the consent of abutting property owners was required before pipes could be laid.

Chicago (Rogers Park). No, although the pipes may be laid by special assessment.

Cleveland and *Syracuse.* Answered under D 37.

Indianapolis. No.

New Haven. No.

D 41. In like manner, state for each the period within which the construction had to be begun.

Chicago (Rogers Park). Ordinance to be accepted within 60 days. Company to spend at least $5,000 for work and material before December 31, 1888, work to commence within 60 days after the ordinance is in effect.

Cleveland and *Syracuse.* Answered under D 37.

Indianapolis. Ninety days. (Section 4, ordinance of January 3, 1870.)

New Haven. No restriction.

D 42. In like manner, state for each the period within which the plant had to be completed.

Chicago (Rogers Park). Work to be completed within a year after it was begun.

Cleveland and *Syracuse.* Answered under D 37.

Indianapolis. The works and 15 miles of pipe to be completed within twenty-seven months. (Section 4, ordinance of January 3, 1870.)

New Haven. No restrictions.

D 43. In like manner, state for each the provisions regarding the rates to be charged.

Chicago (Rogers Park). The following rates for the whole length of the franchise were agreed upon:

Tariff of Water Rates, Rogers Park, Ill.

Barber shops, first chair	$ 5.00
Barber shops, each additional chair	3.00
Bath house, public, each tub	$7.00 to 15.00
Bath house, private, each tub	3.00
Bath house, boarding house, each tub	5.00
Blacksmith shops, one fire	4.00
Blacksmith shops, each additional fire	3.00
Boarding and lodging houses and furnished rooms, per room	1.00
Boarding schools, per room	1.00
Butcher shops (engines and boilers extra)	$7.00 to 15.00
Dental office	$6.00 to 10.00
Drug stores	$10.00 to 25.00
Dwelling houses, five rooms or less for family	6.00
Dwelling houses, each additional room	1.00
Eating houses	10.00 to 25.00
Fountains, flowing not exceeding three hours per day during the season from 1st of April to 1st of November, one-sixteenth inch orifice	8.00
Fountains, one-eighth inch jet for the season, as above	10.00
Hose for sprinkling streets, including washing and sprinkling sidewalks, the outside of buildings, per lineal front foot, business houses, per season of six months	15.00
Same as foregoing, private houses, per front foot	10.00
Hose for sprinkling lawns of sixty-six feet frontage (5c. each extra front foot)	5.00
Hotels, per room	1.00
Livery, sale and feed stables, per single stall, including washing carriages	3.50
Private stables, one horse, including carriage washing	3.00
Private stables, each additional animal	1.50
Stores not specified otherwise, twenty-two feet, or less, first floor.	7.00
Stores, each additional floor	3.50
Stores, each additional front foot	.50
Urinals, in hotels, boarding houses, saloons	6.00
Urinals, in blocks, manufacturing establishments	4.00
Urinals, in private houses	3.00
Urinals, in stores, banks and offices	3.00
Urinals with constant flow, special rates.	
Wash basins, stationary, each after the first, in private family (first basin free)	3.00
Water closets, private, per bowl	3.00
Water closets, public, per bowl	5.00
Yard hydrants, at dwelling or boarding house rates.	

All persons not satisfied with the schedule rates can have the privilege of putting in a water meter at their own expense.

Meter Rates.

Less than 300 gallons per day, per 100 gallons	$.050
300 to 400 gallons per day, per 100 gallons	.045

400 to 1,000 gallons per day, per 100 gallons	.143
1,000 to 3,000 gallons per day, per 100 gallons	.115
3,000 to 5,000 gallons per day, per 100 gallons	[illegible]
5,000 gallons and upward, per 100 gallons	[illegible]
10,000 gallons and upward, per 100 gallons	[illegible]

Rates for all other purposes that may be applied for not named in the foregoing schedule of maximum rates will be fixed by estimation or meter, at the option of the grantee or assigns.

Cleveland and *Syracuse*. Answered under D 57.

Indianapolis. Not higher (public and private) than those charged by as efficient works on the average throughout the United States. Fire hydrants in no case above fifty dollars each per annum. Within these limits, to be determined by voluntary agreement with the right of either party to demand readjustment by voluntary agreement or by arbitration—joint board of five disinterested non-residents—as often as once a year.

New Haven. Under Section 5 of the contract the company agrees that rates shall be "fair and reasonable." If the city at any time does not consider the rates fair and reasonable, it may apply to the highest court of original jurisdiction to appoint a committee of arbitrators (Section 9), and have the rates fixed not oftener than once in five years. Rates, however, shall not be fixed by the arbitrators which will not furnish enough money to pay the operating costs, "including interest on indebtedness, and all labor, material, salaries, damages, renewals, or extensions, repairs and replacement of plant and all taxes;" and, in addition, the present rate (8 per cent.) on existing share capital, and a reasonable return, not exceeding 8 per cent., on additional capital invested in the plant. The arbitrators may require all services to be metered and the findings of the arbitrators must be approved by the court. The rates agreed upon in the contract to start with, which rates the company agreed should never be raised, were as follows:

> *Fifth*—Said Company agrees that the rates for water, to be charged to all consumers of water in said city, shall at all times be fair and reasonable; and if said City of New Haven shall at any time consider the rates so charged for water to be unreasonable, and the city and the company cannot agree with reference thereto, the matter shall be submitted to arbitration as hereinafter provided. It is agreed, however, that said arbitrators shall not fix a rate for water which shall leave to said company an income insufficient to provide means with which to pay its operating costs, including interest on indebtedness, and all labor, material, salaries, damages, renewals, or extensions, repair and replacement of plant, and all taxes, together with a sum sufficient to pay the present rate of dividend upon its present capital stock, and a reasonable return upon such other capital as shall in the future be invested in additions or extensions of the plant of the company not exceeding the present rate of dividend. Said arbitrators may provide that any class or classes of service shall be paid for by meter and not by fixture rates. Said arbitration, when confirmed by the court appointing the arbitrators, shall be final and conclusive upon the parties as to the rates to be paid for water, for a period of at least five years from the date of said arbitration report. Said water company agrees that whenever, in the opinion of its directors, its income exceeds the sum required to properly care for the above mentioned purposes, it will, from time to time, as it may be able, without the necessity of arbitration, reduce its rates for water to the inhabitants of the City of New Haven.

The rates to be charged by the New Haven Water Company to the consumers of water in the City of New Haven, except as said rates may be changed as above provided, from and after May 1st, 1902, are shown by the following schedule, and said rates shall at all times be as low as therein shown, or lower:

Schedule.

Annual Water Rates of the New Haven Water Company.

1. Sinks, Bowls and Faucets:		
For each dwelling occupied by one family, for sink use	$ 5.00	
This $5 rate shall include any number of ordinary household sinks and the use of water for any other household purposes not otherwise rated below.		
Occupied by one family, additional for all set-tubs or set-bowls (either or both)	.50	
Occupied by two families, sink use for each family	4.50	
Occupied by two families or more, additional for all set-tubs or set-bowls (either or both) for each family	.50	
2. Dwellings occupied by two families or more, all using same sink, for each family	4.00	
For any greater number of families, or separate occupants, such rates as may be fixed by the directors.		
3. Large boarding houses	$10.00	and upwards.
4. Hotels	25.00	" "
5. Stores and warehouses	5.00	" "
Offices	3.00	" "
6. Fish markets and saloon sinks	6.00	" "
7. Photograph galleries	10.00	" "
Meters only for running streams.		
8. Barber shops	6.00	" "
9. Water Closets and Urinals:		
Water closets for one family, first closet	$ 3.00	
Each additional closet for same family	2.00	
Water closet used by more than one family additional	1.00	for each family.
Boarding houses, first closet	5.00	
Each additional closet	3.00	
Hotels, first closet	6.00	
Each additional closet	4.00	
Restaurants and saloons, first closet	5.00	and upwards.
Each additional	3.00	
Restaurant and saloon urinals (self-closing), first	4.00	and upwards.
Each additional	3.00	
Outside closets	5.00	and upwards.
10. Bath Tubs:		
Bath tub for one family	3.00	
Each additional for the same family	2.00	
Boarding houses, first tub	5.00	
Each additional	3.00	
Hotels and public bath rooms, first tub	6.00	
Each additional	4.00	
11. Beer pumps	5.00	and upwards.
12. Bottle washers	3.00	and upwards.
The above rates do not include the use of hose for any purpose.		
13. Hose (hand use only):		
Street use, 30 feet front or less	$ 3.00	
Each additional lineal foot	.08	
Lawns and gardens, frontage of 30 feet or less	2.00	
" " " " 30 to 50 feet	3.00	
" " " " 50 to 60 feet	4.00	
" " " " 60 to 75 feet	5.00	
" " " " 75 to 100 feet	6.00	

For each additional hose fixture for the same frontage	1.50
Revolving sprinklers of any kind, movable fixtures or hose used in any other way than by hand, for use of four hours or less per day	10.00
Flowing fountains on measured service only.	
14. Stables:	
Private stables, including carriage washing, one horse	3.00
Each additional horse	2.00
Livery stables, each horse	2.00
Cow stables, each cow	1.00
15. Bakeries:	
For the daily average use of flour, in addition to fixtures rates, per barrel	3.00
16. Steam use:	
Stationary Engines, from 1 to 10 h.p., each h.p.	6.00
" " from 10 to 50 h.p., each h.p.	5.00
" " from 50 to 100 h.p., each h.p.	4.00
" " above 100 h.p.	3.00
17. Building Purposes:	
Brick, per thousand (plain)	.05
Brick, per thousand (including plastering)	.10
Plastering, per 100 yards	.20
Stone work, each barrel of lime	.06
Stone work, each barrel of cement	.02
18. In all cases where water is required for purposes not specified above, the rates shall be fixed by the Board of Directors.	

Meter Rates

	Cu. Ft.	Gal.
1. 134 cubic ft. (1,000 gallons) or less per day, per 100	13½c	.018c
134 cubic ft. to 268 cubic ft. (1,000 to 2,000 gallons) per day, per 100	10½c	.014c
268 cubic ft. (2,000 gallons) and over per day, per 100	07½c	.01c

All metered water will be charged for, whether used or wasted, and a minimum charge per quarter of $2 will be made on all metered services where the consumption of water is less than the above.

If a meter gets out of order and fails to register, the consumer will be charged at the average daily consumption as shown by the meter when in order.

All meters are set by the water company, and a proper charge may be made for the work. All damage to the meter will be charged to the owner or occupant of the premises, and in addition to the service rate a yearly rental of one dollar for each five-eighths will be collected, larger sizes in proportion.

Any consumer may, subject to the regulations of the company, be put upon a metered service, if he shall so desire.

And said company agrees that if ever it shall violate any of its promises or stipulations in this article contained, said city, or any person injured by such violation, shall be entitled to recover from said company the damages sustained by such person by such violation; and in case of judgment in favor of the plaintiff in any suit brought in such case in the name of said city, the damages shall be fixed at not less than twenty dollars.

The company reserves the right in the contract to put any consumer who desires it on the metered service, and to charge $2 per quarter where the consumption is less than that named in the meter schedule above. The company sets meters and makes a "proper charge" therefor, and in addition to the water rate makes an added charge of $1 for each ⅝, and larger sizes in proportion. The company agrees in case it violates the price stipulations, upon conviction to pay the aggrieved party not less than $20 damages in any case, and the actual damage whatever it may be.

D 44. In like manner state for each the provisions regarding (a) source of supply, (b) purity of water, (c) pressure, (d) other elements of service.

Chicago (*Rogers Park*). Source, Lake Michigan; the water to be good, wholesome, clear water, fit for culinary and drinking purposes, to be filtered by the most modern and acceptable process. The pressure was to be "sufficient to throw water through 100 feet of 2½-inch hose and 1-inch nozzle from each of six different hydrants, not located on the same main, to a height of ninety feet above the level of the ground at the Chicago and Northwestern Railway depot, when the air is still." See D 47 for requirement as to pressure of 40 pounds per square inch.

Cleveland and *Syracuse*. Answered under D 37.

Indianapolis. Section 3, ordinance of January 3, 1870, as amended January 24, 1870: water to be from wells, dug as near White River as practicable, but not connected with the river, that the water might be naturally filtered through gravel in its natural place, "provided the same can be so obtained;" the city to be the judge of when sufficient effort had been made by the company in this matter. The latest ordinance contract, approved August 19, 1901, makes no mention of the sources, but as a substitute makes more careful provision for testing the purity. By Section 1, ordinance of 1870, the water is to be "pure, filtered and wholesome water." This phrase is probably to be interpreted in connection with the provisions in Section 3 for "natural filtering or percolation through the gravel in its natural place." Under the contract of August 19, 1901 (Section 16), "good, potable water." By Section 17 all questions of purity are to be settled by two chemists who have the right in case of disagreement to appoint a third, whose judgment "shall be accepted as conclusive evidence of the degree of purity of said water;" the expense to be divided equally, and an analysis to be made at any time upon the request of the Board of Public Works and the Board of Public Health and Charities. By the ordinance of January 3, 1870, the pressure is to be "capable of throwing eight streams at once one hundred feet vertically through a one-inch nozzle, and shall supply that quantity of power for the extinguishment of fire when emergency shall require, under regulations to be prescribed by the Common Council." The contract of June 27, 1887, added to the foregoing the following: "Said pressure and power to be furnished within six minutes from the time when an alarm of fire is sounded from any fire-alarm box located on (the) or within one square of the lines of water pipes." This provision was confirmed by the agreement of January 6, 1892. The same provision is in the contract of August 19, 1901. By the ordinance of January 3, 1870 (Section 4), at least fifteen miles of mains were to be laid within twenty-seven months, while Section 5 required the laying of additional mains by order of the City

Council, provided that there be one fire hydrant on the average of every one thousand feet of pipe so extended, to be paid for by the city at the rate provided for in the ordinance, not to exceed fifty dollars. By the contract of June 27, 1887, the city agreed to order not more than seven thousand feet of mains the first year, six thousand five hundred the second and third each; the city to pay $50 for a fire hydrant for each five hundred feet. This was a three-year contract at the end of which the old provision of January 3, 1870, on extension of mains, was to be revived. In fact, all the provisions of that ordinance were to be in force. The company was to furnish and place at its own expense the fire hydrants. By the contract of January 6, 1892, Section 7, the city had the right to order not to exceed twenty thousand feet of new mains each year, with one fire hydrant furnished and placed by the company, at its own expense, to each five hundred feet of pipe, the price to be $50. By the contract approved August 19, 1901, the city has the right to order not to exceed forty thousand feet of mains per year, one hydrant to be furnished, placed and maintained at the expense of the company, for each five hundred feet of mains, while the price to be paid by the city was reduced to $45 per hydrant per annum. By and since the ordinance of December 17, 1883, the company has been authorized to employ at its own expense a competent man to attend all fires to see that the fire-plugs are properly opened, and to have a general supervision of the fire-plugs, and to see that the ordinances on the use of water during fires are not violated; such man to be under the direction of the Chief Fire Engineer or his assistant at fires.

New Haven. No provision on source. The water to be "pure and wholesome." Pressure not mentioned.

D 45. In like manner state for each the provisions regarding plant and equipment.

Chicago (Rogers Park). Mains to be ample, and from 12 inches to 4 inches, of the best cast-iron pipe, tested at the foundry to 300 pounds, and tested before works are accepted to 125 pounds. No single stretch of 4-inch pipe to be longer than 800 feet. Sixty hydrants on the first five miles of mains to be located by the city. Pumps capable of 1½ million gallons per day at the beginning. Steel stand-pipe not less than 12 feet in diameter, with top 100 feet above the ground. The company agrees to extend mains when called upon to do so by the village, in stretches of not less than 500 feet at one time, provided that one customer per hundred feet agrees to take water at the established rates for two years.

Cleveland and *Syracuse.* Answered under D 37.

Indianapolis. By ordinance, January 5, 1870, Section 3, the pumps and machinery were to be "the Holly System, with all its latest improvements, in its best and most efficient form." Capacity, 6,000,000 gallons per day. The pumps and machinery to be erected under the supervision of the Holly Manufacturing Company. Although the company was not required to propel the pumps and machinery by steam, it was required to have and keep in constant readiness not less than two steam engines for that purpose, to be used in case of emergency. It was to cause as little inconvenience as possible in the construction of its works and laying of its pipes; not to infringe upon or injure the rights or privileges of the gas company or other public works ("including other water works built by the city"). It was to restore the streets to as good order as that in which it found them, and be responsible for all injury to persons and property; to hold the city harmless for suits on that account, and to defend and settle suits brought against the city on account of the construction and operation of the works. In case the company refused to restore the streets, the city had the right to do it at the company's expense.

New Haven. No provisions.

D 46. In like manner, state for each the rights reserved to the city to regulate operation.

Chicago (*Rogers Park*). No rights to regulate formally reserved. The Legislature (Act of 1891) and the courts have established and confirmed the right to regulate prices within reasonable limits, irrespective of any formal reservation.

Cleveland and *Syracuse.* Answered under D 37.

Indianapolis. No provisions, save in regard to the manner of opening and closing the streets.

New Haven. No provisions, except in the contract, as explained under D 43.

D 47. In like manner, state for each the provisions as to taxation.

Chicago (*Rogers Park*). Municipalities in Illinois have no right to interfere with taxation, which must be, under the constitution and the statutes, uniform. The original ordinance, November 12, 1888, provided for the annual payment on the part of the village to the company for fire protection of $575 per mile for the first five miles, and $400 per mile for all additional mileage, and to pay for the first ten years all municipal or village taxes assessed against the company. "The rental (for fire hydrants) shall begin at such time as the said grantee or assigns shall begin to maintain continuously a pressure of 40 pounds per square inch." The payment of such rental is to be discontinued during all periods when the company is failing to supply quality and quantity of water provided for in the ordinance.

Cleveland and *Syracuse.* Answered under D 37.

Indianapolis. So far as I can determine, this is a matter which, by the general tax laws of Indiana, is removed from the power of the city.

New Haven. Answered under D 21.

D 48. In like manner, state for each the provisions as to compensation, including all free services.

Chicago (*Rogers Park*). No compensation, except the free steam (See D 57); unless part of the service which the city ostensibly received for the hydrant rentals might be considered as compensation—water from the hydrants to be used for extinguishing fires, and for flushing sewers and gutters. For flushing sewers, not more than 60 gallons per day each for 10 hydrants per mile; for flushing gutters, not more than two hydrants open at once, and no hydrant opened oftener than twice a week for 20 minutes at a time. There was to be free water for two drinking fountains, with supply pipes ½ inch in diameter, and one jet fountain, ¼ inch orifice, in each public school and at the village offices. The fire engine house was to have free water. The village was to furnish the fountains and fixtures, to make the connections, and keep the hydrants in condition.

Cleveland and Syracuse. Answered under D 37.

Indianapolis. By contract approved August 19, 1901, no provision for compensation, but free water for a fountain for each of eight parks (by name), "and one in each ward park when created, during such contract." Also, not to exceed 30,000 gallons per month for each engine house, each reel house, each station house, and the city dispensary; 400,000 gallons per month for police headquarters; also the necessary water for flushing and cleaning public sewers and improved streets, and filling the public cisterns within reach of the line of pipes; also water for public latrines when constructed under streets; water for Tomlinson Hall, and market houses up to 500,000 gallons per month; for the city hospital up to 600,000 gallons per month; up to 100,000 gallons per day for public baths, when established. Water for sprinkling lawns and roadways in parks, up to 5,000,000 gallons per month. In addition, water from the canal through a 4-inch pipe laid and maintained by the city for the lily pond in Riverside Park; and finally, water for the hose to be used by the fire department in sprinkling the streets adjacent to their stations. Provided, that water used in excess of the respective amounts mentioned above, is to be paid for by the city at 5c. per thousand gallons; the company to furnish and maintain meters, and payment to be quarterly.

New Haven. Under the existing contract, all public water is to be free, except under the contingency provided for. See answer to D 21.

D 49. In like manner, state for each the provisions as to street paving.

Chicago (Rogers Park). No provisions. It is simply required that the streets shall be restored to their former condition when opened; the company to hold the city harmless for injury by reason of the violation of this section.

Cleveland and Syracuse. Answered under D 27.

Indianapolis. No provision, except that the streets when opened shall be restored to their former condition.

New Haven. The city has no power in the matter. The company's charter requires it to restore the streets to good order when it opens them.

D 50. In like manner, state for each the provisions regarding removal of mains.

D 51. In like manner, state for each the provisions as to examination of records.

D 52. In like manner, state for each the provisions as to audit of accounts.

D 53. In like manner, state for each the provisions as to publication of reports.

D 54. In like manner, state for each the provisions as to returns to public authorities.

There are no provisions in any of the cities bearing on these subjects, except the meaningless provisions for reports by the *Indianapolis* company explained under D 31, and the limited returns of the same company explained under D 52 (c).

D 55. In like manner, state for each the provisions as to transfer of franchises to third parties.

Chicago (*Rogers Park*). The original franchise was granted November 12, 1888, to H. E. Keeler, his successors or assigns. The company was not organized until 1889. Apparently unlimited transfer of the franchise would be permitted under the contract ordinance, as the contract was drawn with the express understanding that it was to be assigned.

Cleveland and *Syracuse*. Answered under D 37.

Indianapolis. By the contract ordinance of January 3, 1870, Section 7, the company was prohibited from selling its property and franchise to anybody except the city until it had offered them to the city at the same price that it offered them to others. For the provisions of the new municipal act of 1905, see answer to D 30.

New Haven. The city has no authority in the matter, except under the contract, as explained in the answer to D 30.

D 56. In like manner, state for each the provisions as to labor. No provisions for any of the cities.

D 57. In like manner, state for each the provisions as to other important matters, including renewals.

Chicago (*Rogers Park*). The company agrees to furnish steam for one or more air compressors up to 10 H.P. apparently free; and power above this for such purposes at $75 per H.P. per annum.

It was expressly provided that the village should lay an unrepealable annual tax to meet the payments by the city to the water company, and that the ordinance, upon acceptance by the company, should be a contract.

As the contract was made for the full period permitted by law, nothing is said about renewals, or the disposition of the plant at the end of the period, unless Article 8, authorizing the purchase of the works by the village at the expiration of the first ten years, or at the expiration of any subsequent five-year period, would give the city upon due notice, at the end of the last five-year period, the right to purchase the works. In that case, such purchase would certainly be optional with the city, if permitted. The evident expectation of the village was that it would purchase the works under the contract before the end of the concession. There is no doubt that the City of Chicago, the successor of the village of Rogers Park, can, at the end of the thirty-year period, if it desires to do so, extend its own works to the territory, without purchasing the property of the Rogers Park Company.

Cleveland and *Syracuse.* Answered under D 37.

Indianapolis. By Section 11 of the ordinance of January 3, 1870, it was expressly provided that the ordinance should take effect only when accepted by the Water Works Company of Indianapolis. In case that company did not accept in writing within thirty days, it was open to any other company, organized or to be organized, to accept the ordinance with all of its powers and limitations.

The subject of renewals is not specifically touched upon in the franchise. The subject matter is covered by the provisions on price arbitration for both public and private water, annually, if desired, and by the right to purchase at any time on six months' notice. The general law of April 15, 1905, appears to require advertisement for bids at the expiration of any franchise, but the language is very ambiguous. The provision is not significant for Indianapolis, in so much as the franchise runs to the end of the charter of the company. The city has specifically reserved the right, before the end of the franchise, to admit other companies, or to build its own works in competition. It ought, perhaps, to be remarked that, while the general features of the original franchise ordinance (January 3, 1870) are still in force, with their arbitration clauses for water for private use, these clauses have so far remained a dead letter. The last three contracts, at least, those of 1901, 1892 and 1887, have made no mention of supply for private use; but have been, by their titles, contracts for the public use only. While the city has undoubted legal right, both under its ordinance of 1870, and under the general municipal act of April 15, 1905, within the limits fixed by the charter of the company, to interfere with and regulate the price of private consumers, it has never attempted to do so, but has left the company free to fix its own prices, which have never been approved by ordinance, or questioned by the city.

New Haven. The city has no power to grant franchises. The company's charter is perpetual, and the existing contract with the city is also perpetual.

D 38. Has the municipality experienced difficulty in forcing companies to live up to the terms of their franchises?

Chicago (Rogers Park). The company seems to have lived up pretty well to the contract as the company interprets it, although there is a question as to whether or not the water is the good wholesome water required by the ordinance. It is taken from the lake very near to the shore, and passed through what is said to be a very imperfect filter. The water is frequently reported unsafe by the city authorities. The company admits that it is not equipped to furnish an adequate supply, and cannot be so equipped without rebuilding and extending the works, which it hesitates to do until it can determine the intention of the city in regard to purchasing the plant. In 1899 the city voted to purchase the plant, and notified the company to appoint an arbitrator, which the company did. The city seems to have been frightened at the possibility of paying for the franchise, and dropped the matter. It has three times since that appointed committees to consider the matter of purchase. The commissioner of public works very recently gave orders to have the plant appraised. The company declares its willingness to sell to the city not only at the times designated in the ordinance, but at any time, and to have the price fixed by arbiration. (See letter dated March 14, 1906, from N. A. Partridge, counsel for the company, to E. F. Dunne, Mayor of Chicago.) Mr. Partridge informs me orally that since this letter was written the city has appointed an additional committee, consisting of the Mayor and chairman of the finance committee, to take up the matter of purchase.

As explained elsewhere, the matter took on a new phase when the city, about August, 1906, took forcible possession of the works on the alleged ground that the public health was menaced by the character of the water supplied. I understand that the City of Chicago has since furnished the water from its own works through the distributing system of the company, and that the legal rights of the respective parties in the case are now in the hands of the courts.

Cleveland. No franchise in force.

Syracuse. No franchises in force. When there were, the city had great difficulty in making the company live up to their terms, explained under A 3.

Indianapolis. There has been no particular difficulty where the language of the franchise was plain and specific. There is no doubt that the purity of the water furnished until after the agitation of 1904, the completion of the filter system since, and the walling out of the intake from the river by a cemeted wall since that time, was below the franchise requirements. This has all been changed as the result of the flood and agitation, the investigation, and the subsequent improvement of the plant and the service of the company. The company seems to-day to be living up to the franchise requirements, to be furnishing a sufficient supply of good water, and to be giving general satisfaction.

New Haven. The city has no power in the matter.

D 59. State what provisions it has not been able to enforce, and why.

Chicago (*Rogers Park*). There seems to have been no difficulty, except on the points previously explained. It is probable that the water furnished by the Rogers Park company has been below the standard called for by the ordinance, but the City of Chicago has not raised the question, and doubtless refrained from doing so because the city itself was furnishing water a considerable portion of the time which, if not as bad as the Rogers Park water, was decidedly unsanitary. The Rogers Park company has always alleged that its water was as good as the Chicago water.

Cleveland and *Syracuse.* The question does not apply.

Indianapolis. Nothing, save the matters referred to under D 58. The defects there referred to seem to have been due to a general indifference and ignorance of the public as to the quality and danger of the water until 1904. As soon as the public manifested any serious interest and knowledge, or desire for better water, the company at once began to build effective filters, to test the raw and the filtered water both chemically and bacterially, and as soon as practicable thereafter succeeded in obviating the difficulty.

New Haven. ———.

D 60. What remedies, penalties and means of enforcing the above provisions (D 37-57) have been provided?

Chicago (Rogers Park). Under the system in Illinois of arranging these matters by contract ordinances, a resort to the courts is about the only means of enforcing the contracts. The city has resorted to the courts frequently, as elsewhere explained. About the only means adopted by the city to find out whether or not the company is keeping the contract, is the daily analysis of the water made by the city health department. Explanation is given under D 59 why the city so long hesitated to act on the reports of the Department of Health as to the sanitary quality of the water.

Cleveland and *Syracuse.* ———.

Indianapolis. The means of enforcing such provisions as there are have been perhaps sufficiently set forth under previous questions. There have been no penalties prescribed, save that of forfeiture, and no attempt has been made on the part of the city to resort to that extreme measure. The city has quite recently arranged for regular tests by the city of the water. It is doubtful if they have yet provided sufficient means, equipment and ability for this work.

New Haven. ———.

D 61. *How much deliberation has usually been given to the granting or renewal of franchises?*

Chicago. No water franchises have ever been granted by the City of Chicago. The private water company chartered in 1836 was permitted by the Legislature to occupy the streets without any reference to the consent of the city. It is probable, however, that the charter was granted at the desire of the citizens of Chicago. See James's "Early Charters of Chicago," Part II., P. 36, as follows: "There is no evidence that there was any objection on the part of the community, or on the part of the Board of Trustees [of the village—the first city charter was not granted until the next year.) to this granting away to a private company of the right to use the public streets. Specific granting of this right by the Legislature in the incorporation of the company implied that no power was given to the Board of Trustees to grant such privileges over the streets of the town." The trustees of this time had no legal power to establish a public system of water works, nor was the city given such power by its first charter of March 4, 1837.

It was customary until the reform of the Council in very recent years to suspend the rules and rush through franchises in general, before the general public knew that such were proposed; but the agitation, especially on the street car question, for the last few years, and for the constitutional amendment of 1904, together with the general referendum act and the frequent exercise of the referendum in fact, the improvement of the Council, and the generally awakened public interest, has worked a complete change in this particular. So long as these influences remain undiminished, it seems safe to predict that no important franchises can, or will be passed without the utmost publicity long drawn out, and thorough public discussion. In fact, it is highly probable that important franchises will be submitted to a direct vote of the people, although there be no general law to that effect.

Cleveland. This and the remaining questions of this schedule have no relation to the history of the water supply of Cleveland. It is impossible to answer the question satisfactorily in regard to other utilities without going into the history of the franchises for each of these utilities. In general, whatever may have been the wisdom of the city's action in this particular, I think it is true that, in recent years at least, there has been no lack of publicity. This is notably true since the Chamber of Commerce began to take an active part in all franchise fights. Under the new municipal code I think it safe to conclude that a high degree of publicity will be maintained. There have been great and notable scandals in regard, at least, to the operation of the franchises in Cleveland in other decades, notably in regard to the gas franchises.

Syracuse. In recent years the citizens of Syracuse have not had real cause to complain of secrecy or of haste in granting franchises by the city government; and there have been, so far as I could find out, no scandals in connection with such matters. The newspaper reporters and the citizens usually have free access to matters presented to the Council, before they are actually acted upon. It is safe to say that a high degree of publicity and of public discussion are assured by the law, under the legislation of 1898 and the amendments thereto.

The original drafting of franchise ordinances is naturally, in most instances, done by those seeking the franchises, but even before the new constitution went into effect, and in the days of private water companies in Syracuse, such matters were pretty thoroughly worked over by the Council and the Council committees and the Corporation Counsel, and often by special counsel. See Council proceedings of March 16, 1895, at which meeting the city attorney reported that he had examined the pending ordinance (Central City Water Co.), and that he recommended that the ordinance be passed with certain amendments, which he proposed. These amendments were later adopted.

Indianapolis. In recent years these matters seem to have been handled with considerable deliberation and great publicity. Such must be the case if the city conforms to the recent statutory requirements. Such matters are placed in the hands of the Board of Public Works. This is a bi-partisan or a multi-partisan board of three members on salaries. They must keep a record of their proceedings, with a yea and nay vote whenever the vote is not unanimous. Although I find no statutory requirement to that effect, I am told that all their meetings are public, and that they hold public hearings on all important matters. They have the formulation and signing of all contract franchises. These require confirmation by the Council. They are always published before being acted upon by the Council. While the matter has not been judicially determined, the right of the Council to approve such contracts is generally interpreted not to include the right to alter or amend. Important matters are usually under public discussion for many months, and sometimes for years. The case of the last contract with the water company seems to be typical. That was concluded by the Board of Public Works on December 11, 1900, and approved by ordinance of August 19, 1901. The previous contract with the water company expired January 1, 1897, but had a provision that the company might act under it until a new contract was formed. The Board of Public Works seems to have had the subject of a new contract under consideration for a very long time.

New Haven. The city grants no franchises. Protracted deliberation has been had in recent years in making contracts with the water company. (See supplementary report.)

D 62. Has the exercise of the franchise granting power been attended with public scandal and if so, in what respect?

Chicago. Until about 1897, when the street car agitation reached a climax, it was rare for any important franchise to be passed without a scandal. The scandals affected the primaries, the elections, the jamming through of franchises, the attempts of the companies to circumvent the Council through additional legislation; and the belief was widespread that the rights of the companies operating in Chicago were, not sometimes, but usually established by bribing or attempting to bribe the Governor, the Legislature, and the Council. This happened, not rarely, but habitually.

Cleveland. Answered under D 61.

Syracuse. Answered under D 61.

Indianapolis. There seems to have been more or less scandal in regard to gas franchises. The gas situation has been in a peculiar condition owing to the appearance and sudden disappearance of natural gas. I was unable in the time at my disposal to get at the merits of the charges and countercharges. The matter of the validity of the latest gas franchise was, during my visit, in litigation. Ordinance of August 30, 1905, approving the contract of August 25, 1905, between the City of Indianapolis, by and through its Board of Public Works, and Alfred F. Potts, Frank D. Stalnaker and Lorens Schmidt. (Citizens' Gas Co. of Indianapolis.)

New Haven. The city grants no franchises. The making of the present contract with the company was accompanied with great and protracted scandals, as explained in the supplementary report.

D 63. How much publicity has usually accompanied the granting or renewal of franchises?

Chicago, Cleveland, Syracuse and *Indianapolis.* Answered under D 61.

New Haven. The State Legislature grants and modifies the franchises, and the real moving forces at Hartford do not seek publicity. The more recent contracts between the city and the company have been formed under a high degree of publicity. It is customary, in all such matters, to give public hearings, and to print officially all important propositions, and to give the newspaper reporters access to all important official negotiations.

D 64. By whom are franchise grants usually drafted?

Chicago. Before the reform days (beginning about 1898) by the attorneys of the private interest concerned. Since that date, at least in important matters, if originally drafted by private interests, they are thoroughly worked over in the office of the Corporation Counsel, and, where there is great public interest, by special counsel engaged by the city, and that, too, after a long consideration by a standing committee of the Council, or by special committees, consisting sometimes of both members of the Council and other citizens.

It is probable that franchises in *Cleveland, Syracuse* and *Indianapolis* would be drafted originally in the same way, and worked over in a similar manner by the proper arm of the city government.

New Haven. The city grants no franchises, but deals with contracts with the public service corporations in substantially the same manner as other cities deal with franchises.

SUPPLEMENTARY REPORT ON THE NEW HAVEN WATER COMPANY.

The history and situation of this company are so unique that it seems impossible to include all of the information necessary for the proper understanding of the situation in the schedule. I beg, therefore, to submit, in addition to the answers in the schedule, the following historical sketch and comment on the water supply of New Haven.

As early as 1829 we find the citizens of New Haven, in city meeting assembled, voting aid to the extent of $100,000 in the shape of 6 per cent. bonds to the Farmington Canal, on the ground that the canal would furnish an abundant supply of water for public use, and for cleaning the creek of impurities, and especially for protecting the city against fire. (From the City Records, Vol. I, p. 294.)

The origin of the water company, and the early futile attempts to establish a publicly owned supply are not without interest in this connection. On June 1, 1852, at a city meeting, a committee was appointed to consider the subject of a water supply. This committee reported in print, setting forth several alternate schemes for a public water supply.

On March 23, 1853, a city meeting voted for the first proposition of the committee, namely, a supply from Mill River, by a vote of 128 to 117, the largest vote ever given at a city meeting except for the election of officers. The issue of bonds for this purpose was approved by the city meeting by a large majority. Upon petition of the city, the Legislature authorized the scheme and a loan of $225,000 for the purpose. The act of the Legislature was accepted by a city meeting of July 25, 1853, by a vote of 1251 to 760.

The Board of Water Commissioners authorized by the act organized in 1853, and on Jan. 2, 1854, entered into a contract with Eli Whitney for the necessary water rights and power for $30,000, and an agreement that Mr. Whitney should have for power purposes the surplus water, which they agreed to impound with their dam. Mr. Whitney was to take half of his pay in city bonds. This arrangement was reported to the Council Jan. 18, 1854.

About this time it was discovered that the enabling act was defective in that it designated no person to execute and issue the bonds. The city meeting to deal with this subject, called for Jan. 4, 1854, was adjourned until Feb. 4, 1854. At the adjourned meeting, the opponents of the public water scheme were in the majority. The meeting ordered the Mayor to apply to the Legislature for an amendment to the act, voted to limit the outlay to $225,000, and ordered another vote of a city meeting on the whole proposition. April 10, 1854, the Council voted to apply to the Legislature for an amendment in the charter. At the city meeting of June 6, 1854, the city government was instructed to withdraw opposition in the Legislature to the repeal of the water act. This was met by a popular petition, largely signed, asking the Legislature to call for a report on the water works bill. The result was an act of the Legislature resubmitting the whole question of a water supply to a popular vote and requiring a three-fifths vote to carry it. This popular vote on July 17, 1854, resulted in voting the scheme down by a majority of 808.

Mr. Whitney thereupon attempted, through the courts, to compel the specific performance of his contract, the rights of which had been specifically reserved under the Act of 1854. The court decided (Whitney vs. The City of New Haven, 23 Conn., 624) that specific performance would be a hardship, and that he had adequate redress at law in the form of damages. I am told that his suit for damages resulted in the court awarding him $12,000 damages.

Meantime the New Haven Water Company had been chartered in 1849, and organized in 1850 and 1851, it having elected its first Board of Directors March 8, 1851.

After the failure to establish the public water supply, the company entered into a contract with Mr. Eli Whitney's firm to construct the works, July 14, 1859. Contract price, $350,000; $75,000 of which was taken in stock by the contracting firm, and $25,000 by Mr. Whitney personally.

As soon as the company showed an inclination to establish water works it was beset on the right and left by attempts at competition. The Board of Directors, in its first annual report to its stockholders, speaks of such attempts in the session of 1860, and declares that the directors felt compelled to oppose this, "and if possible defeat its purpose, notwithstanding the great expense they were fully aware would be incurred in the undertaking." A similar attempt was made in the session of 1861, and at this session the Fair Haven company obtained a charter, which prohibited it from supplying water in New Haven; but in less than a year this company was hammering at the doors of the Legislature for the removal of the prohibition. In the session of 1862 the Legislature, under pressure from the New Haven company, refused the Fair Haven company the right to lay pipes through New Haven to reach Fair Haven. The Fair Haven company did not cease its efforts until, in 1867, it obtained the right from the Legislature to compete with the New Haven company in New Haven; provided the company obtained a favorable popular vote to that effect. On September 2, 1867, the popular vote was overwhelmingly in favor of permitting the competition (2978 to 116); and thus began the competition which, as explained elsewhere, was ended in 1876 by the New Haven company purchasing the Fair Haven company, and about 20 years later consolidating the two into a single corporation.

The New Haven company had made a desperate fight against this competition, declaring that it was a breach of faith on the part of the State, and, as the directors expressed it (Sixth Annual Report, p. 4): "It is a lamentable state of legislative morals when the faith of the State carries with it no immunity from attacks within its own doors." The bitterness of the feeling can be realized if we recall that the first dividend paid by the New Haven company was of $1 per share, payable Feb. 1, 1867. The company had met with all of the financial difficulties incident to the Civil War, and had suffered so much that it stated (First Annual Report, P. 18) that the contractor had to advance his private means at certain times to prevent suspension of the work. At the beginning of the second year of operation, the company was so hard pressed, having had water receipts of but $7,359.00 for the first year's operation, that it reduced its salary list from $5,900 to $2,200 per year, the highest salary being that of the secretary, $1,000.

It would probably be hard to find another case of such honest, permanent and skillful construction of a water system at so early a date. The first annual report of the directors to the stockholders declares that, although the contract called for returning to the manufacturers any imperfect pipe, the amount of rejected pipe was so small that it was not worth returning to the factory; and the tenth annual report (P. 4) states that in the history of the company no consumer has ever had his supply temporarily cut off for the purpose of repairing a main. The contract called for a reservoir of 5,000,000 gals. capacity; the contractors constructed one of 10,000,000 gals. The pumps, under the contract, were to supply 2,000 gals. per minute; they were actually capable of supplying 3,000 gals. For about ten years the water was pumped by water wheels. During all this period, the wheels never met with any accident, with a single exception, and that was not serious enough to suspend the supply of water to any individual consumer.

After the installation of the first steam pumps as an auxiliary, in October, 1871, the water wheels were taken up and repaired for the first time. The first mention of relaying any pipes because the pipes were too small is made in the tenth annual report, January, 1872. The reservoir was originally constructed in sections so it could be cleaned.

Water was first let into the distributing mains Jan. 1, 1862. At that time the length of the mains was 17.93 miles.

In the early days the water was pumped directly into the mains, and the reservoirs used only as a reserve supply. This led to the water in the reservoir becoming so stagnant that the water afterwards was pumped through the reservoir.

It will be recalled that the company got its right to operate in the city without asking the consent of the city, and that the city charter of that time did not specifically authorize the city to enter into any contracts, but that under Connecticut law such right was considered incidental to the powers specifically granted. After very long negotiations the company entered into a contract with the city for supplying public water for a period of 20 years. The contract was signed Feb. 7, 1862 (about five weeks after the company began to distribute water), ratified by Council February 7, and by a city meeting February 15, by a vote of 228.

This contract makes no mention of the prices to be charged to private consumers. It binds the company to furnish water for public purposes for a period of 20 years, wherever the pipes of the company may at the time be laid. The estimated amount of pipes at that time was 16 miles. The company agreed to lay 10 miles additional within six years, and to pay actual damage for willful neglect or refusal to furnish water under the contract, the minimum damage in case of conviction to be $10. The city also had the right to annul the contract for willful neglect or refusal of the company to furnish water. The city was to establish its hydrants at its own expense, the number of hydrants to be left to the discretion of the city. The amount to be paid the company for public water began at $1,039 for 1862, and increased gradually until 1866, from which time to the end of the contract the amount was to be $4,000 yearly. The city was given the specific right to purchase the property and franchises of the company after 10 years by paying the amount the company had expended on its works, plus 10 per cent annually, less the dividends actually paid by the company; the company agreeing to join in promoting legislation to enable the city to make such purchase. The city was given the option of renewing the contract at a price to be fixed, in case of non-agreement, by a commission appointed by a judge of the Superior Court on application of the city, the commission to consist of one non-resident of the city, not a stockholder; one resident of the city, a stockholder, and one resident, not a stockholder.

The clause fixing a penal sum for damages in case of willful neglect or default has been continued in the later contracts, and in the later contracts applies to supply to private individuals, and has had a curious history,—a history which probably shows the practical uselessness of such provisions. At the time of the great fire on Long Island Wharf in 1886, the property owners attempted to hold the company responsible, alleging that its pipes were not adequate to furnish a suitable supply of water. A letter of Sperry & Barnes, dated July 10, 1886, making claim under this provision, was referred to the counsel of the company, Mr.—now Judge—Simeon E. Baldwin. Counsel Baldwin replied that the 6 in. main on Long Island Wharf was laid in 1878, and at that time was deemed sufficient by the city, and that the company was bound to furnish water only where its mains were laid. He said he did not think the company would be liable to any private individual for failure to furnish enough water to put out fire on his premises, "nor would you in such case be liable to the city for the $10,000 penalty, except for *willful* default, and the courts would want strong evidence of that." Such is the significance of the punitive damage clause.

The original contract of 1862 defined very narrowly the public purposes for which water was to be furnished. The growth of population and civilization required water for additional purposes, and the annexations to the city required the readjustment of the relations between the city and the company to meet the growing needs. These were made, between 1862 and 1878, by numerous supplementary contracts, the old contract remaining in full force.

A considerable sentiment in favor of public ownership grew up before the end of the 20-year period for which the contract was made. The advocates of purchasing the works and franchises of the company procured an act, in conformity with the provision of the contract, authorizing the company to sell and the city to purchase on the conditions named in the contract of Feb. 20, 1862. The act went into considerable detail as to procedure, and especially as to determining the prices to be paid under the stipulations in the contract, and required the matter of purchase to be submitted to a popular vote on Nov. 8, 1881. Among other things, the act required the company to submit an itemized statement of its investment, paid-up capital stock, and the amount it considered the city would have to pay under the contract. It also authorized the appointment of a special investigating committee to be aided by expert accountants, and to have the right to compel the attendance of witnesses, to take testimony under oath, and to inspect the books, records, papers and vouchers of the company, with a view to determining what should be paid.

Sec. 4 of the act authorized a city loan of $2,000,000, at 5 per cent., for purchasing the works, and gave the Superior Court full jurisdiction over all matters of dispute in carrying out the transfer, with the necessary right of appeal on questions of law to the Supreme Court.

Independent of this act a joint special committee of the Council made an elaborate investigation on the ownership of water works, and in July, 1881, submitted their report in print to the Council, recommending public ownership.

The special committee appointed under the Act of 1881 was a distinguished one, with Professor Simeon E. Baldwin at its head. The committee organized on June 16, 1881, and reported on August 29, 1881.

Meantime the company, under the statute, had reported to the city, declaring that its books had not been kept with a view to furnishing the details specified in the statute, and that the company was unable to do so, but submitted a very vague statement, claiming under the contract a total of $2,222,236.11. It will be recalled that they were entitled under the contract to a sum equal to the share capital actually paid in and invested in the works, plus 10 per cent. annually, less the dividends actually paid.

The special committee of investigation found the sum due under the contract to be $1,464,297.16. They made minor deductions from the company's estimate for certain stock that was subscribed for in war times, and never paid in full, and certain other deductions for the stock paid, as they estimated, at a considerable discount, to the contractors who built the works, and also for a few thousand dollars of stock subscriptions collected by a former treasurer of the company, and embezzled by him, on the ground that this sum was never invested in the works. The committee also refused to allow payment for some $20,000 of engineering expenses at the beginning. It refused absolutely to allow the company anything for the $100,000 of its stock paid for the Fair Haven company, on the ground that the city had the right to purchase the Fair Haven company on substantially the same terms as it had the New Haven company, and that the debt of $125,000 assumed by the New Haven company at the time of the purchase, and in case of purchase to be assumed by the city, represented the full value of the Fair Haven company. But the chief item of difference between the estimate of the company and that of the city, amounting to $746,191.88, consisted of compound interest at 6 per cent. on the annual dividend of 10 per cent. to which they considered they were entitled. The committee said very properly: "The terms of the contract give no support or color of support to such a charge." In submitting its report, the company said of this item: "In the above claim we have compounded interest at the legal rate, which we believe to be equitable and in accordance with the contract."

With such a difference, it was inevitable that the works could not be purchased without the intervention of the court. The investigating committee, however, found that the income from water had increased in nine years from $81,046 to $131,576; and the operating expenses as shown by the books of the company during these years varied from $22,330 to $40,842 in 1875, but had dropped to $29,121 in 1880. These items omitted interest.

The committee recommended immediate purchase, declaring that under the contract the works could be bought for very much less than they were worth on the basis of earnings. The committee estimated that, allowing nearly $50,000 for immediate extension and repairs to put the system in first-class condition, bringing the total cost up to a million and a half, the city could at once carry the interest on the loan to purchase the works, and set apart $36,250 per year for a sinking fund.

It was not until Sept. 1, 1881, that the City Council ordered the Corporation Counsel to apply to the Superior Court for the determination of the amount to be paid the company. At the same time the Council ordered the printing for general distribution of 3,000 copies of the special report of the committee. Such petition was filed on Sept. 15, 1881. The Board of Appraisers did not organize until Oct. 5, 1881, about a month before the election to vote on the question of public works.

The company had claimed that the amount of capital stock paid in was $1,102,615, and that it was all invested in the works. The appraisers found that this item should be $895,005.02, a difference of $207,609.98. This was a virtual refusal to allow anything for the stock paid for the Fair Haven company, with some additional minor items excluded. The appraisers also found that no compound interest as claimed by the company was to be paid, and that the total amount to be paid the company was $895,005.02, plus interest from the date of each payment on the stock, less the $622,925 actually paid in dividends.

One of the three commissioners refused to sign the report on the ground that the $200,000 in stock paid for the Fair Haven company, with interest of 10 per cent. on it from the time of issue, ought to be included in the amount to be paid by the city.

The interest, less the dividends, would bring the total sum to be paid by the city up to about $1,100,000. The stock was selling on a basis of about $1,800,000.

The company made a desperate effort to prevent the court from approving the findings of the commission. First, it entered a demurrer on Sept. 5, on the ground that the city had not exercised, and did not propose to exercise, its right of purchase until after the election of Nov. 8. The report of the appraisers was not submitted until the 2d of November, six days before the vote was to be held on ownership. The company then entered a formal remonstrance, and asked for time to work up its case. Judge Sanford ordered the company to file its answer by Saturday, but said he would not hold court on Saturday or Monday, which would carry the matter over until after the election. The remonstrance of the company was based on the evidence of the stock paid for the Fair Haven company, and on the ground that the appraisers took evidence of the cost of the Fair Haven works, whereas what the New Haven company paid for them ought to be conclusive. The company also claimed in its remonstrance that the real intention was that the company should be made as well off as if it had actually received 10 per cent. dividends each year. This was really the interest claim. To back this up, it introduced the original rejected draft of this clause of the contract. In the remonstrance the company claimed $1,820,552.49.

In the city's answer to the remonstrance, it alleges that the Fair Haven company was bought in bad faith to defraud the city of its just rights, and, above all, to prevent the city from purchasing the Fair Haven company, or making a contract with it for the supply of public water.

Meantime, not having got a final ruling by the court until after the election, the company bent its energies to procuring an adverse vote on the proposition for the city to purchase the company. It was alleged that the company spent large sums of money to carry this election. (See "Our Plain Duty," No. 8). It is also alleged that at many of the polling places it was impossible for voters to get any ballots in favor of purchase, the ballots for and against being different.

The vote was against public ownership: 3198 for; 5062 against; 93 "scattering"; majority against purchase, 1864.

Immediately after the election, on Nov. 26, the company entered another remonstrance against the court's approving the findings of the appraisers, on the ground that the adverse popular vote had decided the matter.

The city answered this with the statement that the election settled nothing, because the city had about two months yet to exercise its option of purchase in before the contract ran out, and because the election had been held before the report of the appraisers had been fully known, and within five days after it was filed, and before it had been acted on by the court; and that the company had purposely and willfully carried on a campaign to make the people believe that the court would award over $1,800,000, as stated in their first remonstrance. The answer alleged also the improper use of large sums of money "amounting to many thousands of dollars," for influencing public opinion—"to bribe, corrupt, mislead and unduly influence large numbers of said freemen to vote against said purchase." The city denied that the vote was a fair expression of the choice of the city. It also denied that the vote was legally taken; and declared that no proper check lists were kept, and "that the officials in charge of the ballot boxes refused to allow any freeman to vote on the water purchase unless at the same time they voted for representatives," and that thus many voters were deprived of their right to vote on the question who would have voted in favor of the purchase. The city claimed, therefore, the right to take another vote before the contract expired on Feb. 20, 1882.

The company filed a petition with the court to expunge the city's answer from the record, on the ground that it was irrelevant; and further petitioned that, if the court considered any of it relevant, the charges of fraud and illegal action be made more specific.

It is plain, however, that after the city election this was a purely legal squabble without any practical significance. The question of public ownership was certainly for the time settled; and soon thereafter the company and the city entered into negotiations with a view to forming another contract.

There is no doubt, as Prof. Simeon E. Baldwin said in a signed letter to the *Palladium,* Nov. 1, 1881, that the property and franchises could be bought for much less than the earning capacity of the company under that contract. He saw very clearly that the real question at issue was the value of the franchise, and warned the people that if they did not buy under this contract, under which they would not have to pay for the franchise, they would never have another opportunity to buy the property without paying full value for the franchise. He said that all the talk of the company about its willingness to sell under a future appraisal was a mere blind, as the appraisal would include the value of the franchise, and that the franchise was worth almost as much as the works. He declared that the value of the franchise was a million dollars. He advocated public ownership, and stated that, "We have never found any difficulty in getting our best men to take places on our city boards. One of the most active members of the Board of Public Works is also a director of the water company now, and another of their directors was long on our Board of Selectmen." He further predicted that the company would soon be paying 10 per cent. Professor Baldwin knew a good thing when he saw it. He soon afterward became a shareholder of the company, and also counsel for the company.

On Dec. 15, 1881, the company entered into its second general contract with the city for a supply of public water for a period of 10 years, and agreed on maximum prices to private consumers. It bound itself to no obligations to extend pipe, but agreed to furnish water to the city and to all the portions of the Town of New Haven within the city, excepting the almshouse, for all public purposes, at $16,000 per annum. It agreed to renew this contract indefinitely for periods of 10 years on terms to be fixed in case of non-agreement by three arbitrators, such as were provided for under the earlier contract. The famous clause on punitive damages appears in this contract. This city had the right to annul the contract for neglect or for inadequate supply where the pipes were laid. The city was to establish its own hydrants at its own expense, and to use and control them. The private prices were never to be higher than those at that time charged, with punitive damages of $20 to the plaintiff in case of violation.

Probably the most significant clause was No. 6, which provided that the city might purchase the works and franchises of the company at any time at a fair cash value to be fixed by arbitrators, the company agreeing to aid the city in getting legislative permission to make the purchase.

The company further agreed not to force meters on consumers, but to give every consumer his choice, and bound itself to a supply to all consumers within reach of its mains, or those who would lay connections to the company's mains. Punitive damages of $20 again.

The city agreed to drop the case above referred to, pending in the Superior Court, for the purchase of the company.

This is the contract in which the strange stipulation appears for the first time that the company will ask the Legislature to make the contract a part of its charter, and to grant the citizens the power of enforcing the stipulations of the contract. This was done by the Legislature March 22, 1882.

It will be seen by this statement that the city had no power to compel the company to extend its mains, although the company was bound to give adequate supply where mains were laid. In an opinion on this contract by the Corporation Counsel, dated Nov. 9, 1880, he seems to place great value on the punitive damage clause. He apparently was not familiar with the attempt of Sperry & Barnes to collect damages under this clause, or the opinion of Professor Baldwin, counsel for the company, on the interpretation of the clause, which opinion was given the previous July.

The ten-year period of this contract proved a profitable one for the company, which three years before had reached a permanent condition of 8 per cent. annual dividend. The receipts from the sale of water in 1882 were $145,262.60; in 1891, they were $232,023, an increase of about 60 per cent. The property had probably greatly appreciated meantime; but the excitement for public ownership when this contract was made was so great that the public was able to have inserted in the contract a clause which virtually made the contract perpetual; that is, the city had a perpetual right of renewal by 10-year periods. But the terms of purchase provided under this contract were entirely different from those under the contract of 1862. The contract of 1862, afterward affirmed by the Legislature (in the Act of 1881) limited the amount to be paid to the share-capital actually paid in and invested in the works, plus 10 per cent. per annum, less the dividends actually paid, or brought the value down, roughly speaking, to the value of the tangible property, without compensation for the franchise.

The contract of 1881, on the contrary, provided expressly for a fair and just compensation for the property, rights and franchises, thus assuring the company at any time a full compensation for the franchise, as that compensation might be judicially determined.

Things went on very smoothly with the company until near the end of 1891, when the city exercised its option under the contract of 1881, and renewed the contract for another period of 10 years.

The new contract bore date of Dec. 15, 1891, and was to expire Feb. 20, 1902.

The receipts from the sale of water rose from $232,023, in 1891, to $358,908.82, in 1901, an increase of about 55 per cent, and the general prosperity of the company increased very greatly.

As the time again drew near when the city had to exercise its option of renewing the old contract for another period of 10 years, or making a new one, all parties seemed inclined to a new deal. The company, having 20 years before achieved one of its great objects; that is, to assure itself ultimately the full value of its franchise, desired to be undisturbed by frequent renewals of the contract; and having, in its original charter, perpetual rights in the streets, and, in the contract of 1881, assurance of compensation for its franchises, was anxious for a perpetual contract for the supplying of public water. Public sentiment seemed to be but little in favor of public ownership, and the radical element in the community—the opponents of the company—who did desire public ownership, were not inclined to move before the time for renewing the old contract or making a new one. They insisted on certain principles, however, in a contract, which made it necessary to abrogate the old contract, and principles which were probably untenable. They insisted first, last, and all the time. on a very short contract—three years being the favorable term mentioned, sometimes a single year—and absolutely free water for public uses.

The company, throughout its whole history, and especially during the last decade, had always exercised a very large influence on the political life of the community, and had never been without powerful friends in official positions in the city government. In fact, as far back as the City Committee of 1852, the company had three representatives out of nine on the committee. When the matter of the contract first came up, Nov. 11, 1901, the president of the Common Council, Mr. Harkin, was an employee of the water company. Several other members of the Council were employees of the company and the Corporation Counsel all through the negotiations was the brother of the secretary of the company. A rule had been passed the previous June authorizing the president to appoint all Councilmanic members of joint special committees. The first joint committee seems to have been very favorable to the company, and somewhat inefficient—so much so that the opposition alleged that the public hearings they gave were given before the chief propositions on which the committee depended had been made by the company. The result was that the committee was discharged, and, at the instigation of the opponents of the company, the rule authorizing the President of the Council to appoint the Councilmanic members was rescinded on Jan. 28, 1902, and a new joint committee appointed.

The new committee was appointed but three weeks before the old contract expired. They gave a public hearing on Feb. 6, 1902, which was largely attended. The majority report of the committee alleges that every person who desired to address the committee was heard. The opposition maintained that they never had a fair hearing. Feeling, before the second committee was appointed, was already running very high. The opposition had founded special newspapers to carry on the campaign, and open charges of fraud, corruption and bribery were rife. The company had submitted three propositions. The first proposition was for a 10-year contract, renewable on the same terms for successive periods of 10 years, at the option of the city, at $20,000 a year for public water; private prices not to be raised above the then existing scale; the city to have the right to purchase at any time for a just and fair compensation, to be determined by arbitrators; the company not to compel the use of meters; to be compelled to furnish water, public and private, along its mains; the company agreeing to appeal to the Legislature to make the contract obligatory. The second offer was for a 30-year contract, with free public water; private rates not to be raised above the existing schedule; the city to have the right to purchase only after a judicial determination that the company had violated the contract, and then to pay a just and fair compensation, to be fixed by arbitrators; the company not to compel the use of meters. The sting in this proposition was that the city was to hold the company harmless for any and all taxes other than those at that time laid. A further right of purchase was given at the option of the city at the end of the thirty years, if the city did not wish to renew the contract for another period of 30 years. The effective opposition to the company, however, so far as it was effective, insisted first, last and all the time, on free water, which ruled out the first proposition, and the hostility to the exemption of the company from future taxes ruled out the second. It seemed probable from the time that these three propositions were made, that the third, with such modifications as the opposition could force, would finally be adopted, and such proved the case.

The contract was finally authorized by both boards of the Council late at night on February 13, the same night that the new Water Committee reported, and but a single week before the expiration of the existing contract. The details of form were left to be adjusted by the Corporation Counsel and the Mayor. The motion to substitute the minority for the majority report was voted down, 16 to 25, the same vote by which the contract was authorized. The Board of Aldermen through the whole performance attracted virtually no attention and rushed things through. The contract was finally officially signed on Feb. 17, 1902.

It is in the form of a perpetual contract, with free public water for all public purposes; the city to erect its own hydrants—as many as it pleases. The city under the fifth clause has the right once in five years to have the prices to private consumers fixed by arbitrators. The terms of the arbitration, however, are such, it seems to me, as to deprive the arbitration of all significance. The price is not to be reduced by arbitration below what will pay all the operating costs, renewals, extensions, and all and every other kind of expense, including interest on debt, funded and unfunded, and, in addition to this, 8 per cent. dividend on existing share capital, and a reasonable return, not exceeding 8 per cent. on any additional capital that may be invested in additions or extensions of the plant. Considering that the laws of Connecticut as to the creation of debt, funded or unfunded, are somewhat liberal, and that the company to-day has but half a million of funded debt, and that apparently on the eve of being converted into stock, it is plain that if the company so desires, it can legally absorb any possible earnings of the company, and thus nullify this clause. The city, if it ever gets a reduction of price under this contract, must get it under the sovereign right of the State to regulate, or must get it under the vague promise, without legal significance, of the company contained in the same clause, to reduce the prices voluntarily, without arbitration, when circumstances justify it.

The contract gives the city absolutely no power over the quality of the water. The sixth clause contains a pious promise on the part of the company "to use all reasonable efforts to supply said city and its inhabitants with pure and wholesome water." The famous punitive damage clause, previously referred to, reappears in this contract. The company agrees to sell to the city at the end of 25 years, and of each successive period of 25 years, at a fair compensation for property and franchises, to be determined by arbitrators. It also agrees to sell at any time when it shall be judicially determined that the company has not kept the contract.

The city binds itself not to distribute water through mains itself, but to take water from the company.

It is expressly agreed that no failure to keep the contract shall annul it except in accordance with the terms of the contract itself.

The one other significant provision—a provision on which concession was made from the original proposition, is that the city agrees to hold the company harmless for any taxes other than taxes on tangible property, and such as are at present laid; or in lieu thereof, to pay for the public water $20 per hydrant per year for fire purposes, and for other purposes the lowest meter rate to private consumers, less 25 per cent. thereof.

The contract provided that the city and the company should unite in asking the Legislature to affirm this contract by making it a part of their respective charters. Such confirmation was obtained by Act of June 1, 1903.

The opposition fought very bitterly and persistently against the acceptance of this contract by the city, maintained regularly for a long time two newspapers which were founded for the particular purpose of opposing this contract, and charged in season and out of season that the contract was bought through the Council by fraud and bribery, and enormous expenditures of money on the part of the company.

They made a great outcry against what they called the stock-watering of the company, and used the following statement, prepared by Mr. George M. Wallace, in illustrating their point:

CAPITALIZATION OF NEW HAVEN WATER COMPANY.

Table Furnished by Geo. M. Wallace, 42 Church St., New Haven.

Date	*Capital*	*Increase*	*High*	*Low*	*Average*	*$1.00 Par, Worth*	*Whole Increase Worth*	*Profit to Stockholders*	*Necessary Capital to Raise Increase*
1874	$400,000								
1875	550,000	$150,000	56	52	54	$1.08	$162,000	$12,000	$138,888
1876									
1877									
1878	800,000	250,000	67	66	66.5	1.32	330,000	80,000	189,394
1879									
1880									
1881	1,025,000	225,000	83	77	80	1.60	360,000	135,000	140,625
1882									
1883	1,306,250	281,250	106	101	103.5	2.07	582,187	300,937	135,870
1890									
1891									
1892	1,587,500	281,250	103.5	98.5	101	2.02	568,125	286,875	139,232
1893									
1894									
1895									
1896	1,900,000	312,500	103	101.5	102.25	2.045	639,063	326,563	152,812
1897									
1898			110	108	109	2.18			
1899			116.25	112	114⅛	2.285			
1900			124.5	116	120¼	2.405			
1901	2,400,000	500,000	118	111	114.5	2.29	1,145,000	645,000	218,341
1902			119	125	122	2.44			
								$1,786,375	$1,115,162
1903			122			2.44			
Future	2,900,000	500,000			117.5	2.35	1,175,000	675,000	212,766

Year.	*Unnecessary Increase or Water.*	*Dividends 8 Per Cent.*	*Amount of Dividends on Water.*	*Per Cent. on Capital Less Water.*
1874	......	......	......	...
1875	$ 11,112	$ 48,000	$ 889	$8^{1}/_{7}$
1876	......	48,000	889	"
1877	......	48,000	889	"
1878	74,436	72,000	6,844	8.8 plus
	$ 85,548			
1879	......	72,000	6,844	"
1880	......	72,000	6,844	"
1881	84,375	90,000	13,594	9.4 plus
	$169,923			
1882	......	90,000	13,594	"
1883	......	90,000	13,594	"
1884	......	90,000	13,594	"
1885	......	90,000	13,594	"
1886	......	90,000	13,594	"
1887	......	90,000	13,594	"
1888	......	90,000	13,594	"
1889	145,381	112,500	25,224	10.3 plus
	$315,304			
1890	......	112,500	25,224	"
1891	......	112,500	25,224	"
1892	142,018	135,000	36,586	11 (10.975)
	$457,322			
1893	......	135,000	36,586	"
1894	......	135,000	36,586	"
1895	......	135,000	36,586	"
1896	159,501	160,000	49,346	11.5 plus
	$616,823			
1897	......	160,000	49,346	"
1898	......	160,000	49,346	"
1899	......	160,000	49,346	"
1900	......	160,000	49,346	"
1901	281,659	200,000	71,878	12.4 plus
1902	$898,482	$2,957,500	$672,575	
Filter	287,234	240,000	94,857	13.2 plus

As a matter of fact, the company has never been guilty of stock-watering in the strict sense of that term. The laws of Connecticut require additional issues of stock to be offered at par to the stockholders; but for more than thirty years the stock of this company (par value, $50) has been much above par. The consequence is that the stockholders, receiving the new issues at par, have made a large profit; and it is true that the amount of stock issued each time has been much larger than would have been necessary to raise the required funds if the stock had been sold at auction. As will be seen by Mr. Wallace's statement, the gain to the stockholders in the last thirty years has been nearly $2,000,000.

Mr. Whitney informs me orally that he is advised, both by the regular counsel of the company and also by special counsel, that under Connecticut law a stockholder would have the right to restrain the company from issuing stock at a premium; that he—Mr. Whitney—considers it inadvisable to raise further capital by issuing at par to the stockholders, and will recommend that further improvements be made by the issue of bonds instead of stock, the company having the right at present to issue bonds to half the extent of its share capital, and having but half a million of bonds outstanding, and these convertible into stock, a conversion which is likely to take place soon.

It would seem, therefore, that the term stock-watering, of which the opponents of the company made such free use in 1901-2, is scarcely applicable to the circumstances, although the stockholders have certainly had a very rich field under Connecticut laws.

The opponents of the company proved to have force enough to prevent the re-election of any member of the Court of Common Council that supported the contract, with a single exception.

They insisted that a public investigation of their charges of bribery and fraud on the part of the company should be had, and finally succeeded in getting the City Attorney and the Assistant State's Attorney to hold a secret investigation. I regret exceedingly that I was refused a sight of the stenographic report of this investigation. The City Attorney, who conducted the investigation, however, talked very freely to me about the investigation, and the facts brought out. The opposition had alleged in print that the company spent $40,000 to put the contract through the Council and the Legislature, and presented various affidavits to the effect that various members of the Council had been offered bribes, and that they believed they had received them. The City Attorney did not deny that the company had spent large sums of money in creating public opinion favorable to the company and to this particular contract. He denied, and probably correctly, that there was any just ground for criminal prosecution.

Having failed to prevent the passage of the contract by the City Council, and to bring about any prosecutions by the proper law officials, the opposition made a still more vigorous fight at the State capitol. They appeared before the Legislative Committee, demanding a legislative investigation of the contract, asking that action be deferred by the Legislature until after such investigation, reiterating all their charges, and furnishing their affidavits so far as the Legislative Committee would receive them. (The protestants seem, in fact, to have received scant justice at the hands of the Legislative Committee.) They claimed that their documents were never received, and that their opportunity to present the case orally was a farce because of the limited time allowed them.

They then carried the matter to the Governor, presenting their evidence there, and the Governor sent for the Attorney-General, who sat with the Governor to hear the protests. They once more demanded a thorough investigation of the passage of the contract by the city, and a veto of the legislative act. All these requests were refused.

LABOR AND POLITICS

United States Water Works

(Schedule II)

By J. W. SULLIVAN and JOHN R. COMMONS

Chicago. Water and Electricity. A distinctive feature of municipal employment in Chicago is the conduct of the Civil Service. The Civil Service Law is more drastic in its provisions than any other similar law in the country. It covers the entire force of all departments except the head of the department, who is considered a member of the Mayor's Cabinet.

Three commissioners, appointed by the Mayor from the two leading parties, have control of the service. They conduct examinations, written and oral, for all employees above the grade of common laborers, and the heads of departments are required to appoint the applicant who is certified by the commissioners as standing highest in the examination. The appointing officer has no discretion whatever, since the Commission certifies to him only the exact number of names for which he makes requisition. Laborers are selected by lot after passing a physical examination. The payrolls of all departments go through the hands of the Commission before reaching the Comptroller, and any appointee not approved by them is struck off and the payment of his wages out of city funds is illegal. The appointee is placed on probation for six months, during which time his superior officer may remove him on filing his reasons in writing with the Commission. After six months he can be removed only on charges made by his chief and approved by the commissioners after a public hearing. Promotions also are governed by the Commission, but in this case the appointing officer has a choice of the three names certified as standing highest on the promotional examination.

This radical form of restricting the authority of the heads of departments was rendered necessary by the extreme abuses of the appointing power in rewarding political workers. That the people of Chicago appreciated the gravity of the situation is shown by the referendum vote in 1895 of two to one in favor of the law. But it required several years to bring the law to its present state of efficiency. The first commissioners, exceptionally able and upright men, were displaced by appointees of the succeeding Mayor with the intention of breaking down the law and restoring the former practices of political appointments. This culminated in the appointment of a commissioner so disreputable that he finally was compelled to resign after exposure of his criminal record. Since that time public opinion has supported an effective enforcement of the law, and, except in a few corners of the service, politicians do not attempt either to evade or violate it.

The weaknesses of the law are found mainly in its dependence on the character of the Mayor. A spoilsman as Mayor can displace efficient commissioners by those who will assist him in giving positions to his political supporters. This has been done and might occur again, especially when a Mayor succeeds one of a different party. Public opinion, however, with the intense interest which has been shown in the Civil Service in Chicago, has demonstrated its strength in restraining even such a Mayor, as it did when Mayor Harrison displaced the corrupt commissioners of his first two administrations by the efficient commissioners of his third and fourth administrations.

Another weakness is the failure, or inability, of the Commission to maintain eligible lists, especially to meet large additions to the force in any department. The law requires advertisement of two weeks, and the staff of the Commission is inadequate to handle more than three or four examinations a week, so that in the case of skilled labor two months are usually required to prepare an eligible list. If the Commission is unable on this account to certify names to the appointing officer it grants permission to make "temporary" appointments for sixty days, as he sees fit. The officer may make "emergency" appointments in cases of accident, etc., but he must notify the Commission within five days on penalty of having his appointees' pay held up. These temporary and emergency appointments are good only for sixty days at the furthest, but the Commission may renew the permit. When an examination is finally held the temporary incumbent may stand a better chance of leading the others on account of the experience he has gained in the position. Here is evidently a field for a corrupt Commission to permit evasion of the law. Unquestionably there is a goodly number of remunerative positions now held by those who originally came in as "sixty-day men," during the *régime* of the discredited Commission. But no evidence was found that during the last five years this large opportunity of evasion has been used. The subject frequently comes before the public and arouses much speculation and frequent accusations. This led to an investigation in May, 1906, on a resolution adopted by the Council, which showed that of the 13,000 municipal employees there were 150 at that time holding "sixty-day appointments." The number increases largely when much construction work is going on. The Electricity Department, with an appropriation of $500,000, made in April, 1906, increased its force rapidly from the permanent number of 425 to a temporary number of about 1,600. The eligible lists were quickly exhausted, as were fresh examination lists as soon as posted, so that in order to rush the works there were at one time as high as 225 mechanics and laborers holding temporary appointments on permits from the Civil Service Commission. One reason for the rapid exhaustion of the lists in case of these temporary appointments is the fact that workmen on the list have permanent jobs elsewhere. Another reason is the one already stated of the inadequate staff of the Commission.

Considerable inquiry revealed only one class of labor where Aldermen are able to put their adherents to work, namely, the teamsters in the Water-Pipe Extension Department, and in the Street Department. But it turned out that the teamster is hired along with his team and wagon, and is therefore really a contractor, exempt from the Civil Service Law.

The Commission, in March, 1906, devised an effective plan for checking the sixty-day appointments. The year is divided into sixty-day periods, and all permits to make such appointments in all departments are made to terminate on the same day. This avoids intricate records, and the Commission starts each period with a clean slate.

The law covers promotions, and the Commission holds examinations for the purpose. These are limited to the next lowest grade, provided two applicants register, but if only one registers the Commission may go lower down. A defect in the scheme is that the grades are based on the amount of compensation and not the duties, and the Commission is considering the difficult problem of revising the classification on the basis of duties. Another defect is the certification of three names instead of the one name standing highest. Instances were noted where this leeway was taken advantage of to exercise political preference.

Exceptional safeguards are thrown around the examinations. They are made practical, and means are taken to insure public confidence in their integrity. Questions for the written examination, in one case, are made out by the head of the department, in other cases by outside parties known to be versed in practical work of similar character. A device has been worked out which prevents identification of the applicant. This, of course, is impossible in the case of the oral examinations. The examiners are selected after the papers are written. There are always three examiners, one a representative of the trade union concerned, and two private employers. Inquiry among trade unionists showed perfect confidence in the honesty of the examinations, and the Secretary of the Commission states that there has never been complaint of discrimination from the non-union element. After the law was adopted in 1895 trade unionists held back from the examinations on account of distrust, but now they take the examinations with others. The applicant rated highest by the three examiners gets the appointment.

The following table shows results of examinations in 1905 pertaining to the Electricity and Water Departments:

Civil Service Examinations, 1905.[1]

Kind of Examination	*When Held*	Number		Examinations Requiring Experience and Trades	
		Examined.	*Passed.*	*Examined.*	*Passed.*
Aerial Linemen	Mar. 21	28	20	28	15
Aerial Linemen	Oct. 3	32	28	32	28
Interior Wiremen	Aug. 2	28	1	28	1
Interior Wiremen	Nov. 21	16	2	16	2
Arc Lamp Trimmers	May 9	60	20	60	20
Stationary Firemen	Apr. 14	100	60	100	60
Coal Passers	Apr. 12	124	108	124	108

As regards unionism, these Civil Service rules, of course, secure the appointment both of unionists and non-unionists. Yet in both the Water and Electricity Departments practically all of the appointees who are not members soon join the unions. This is on account partly of the strong trade-union sentiment in Chicago and partly of the protection of their rights under the law which the unions represent themselves as able to give to their members. Trade-union agents say it is easier to get civil service appointees to join than it is to get "hold-overs"—the latter rely on the politicians who gave them the jobs before the Civil Service Law became effective. In this way the Electrical and Water Departments are "open shop" rather than "closed shop," but in practice they are "union shop." In the case of sixty-day appointments it is possible for the "closed shop" rule to prevail, depending on the inclinations of the head of the department, as is the practice under the present City Electrician. Of his own accord he has entered into a written agreement with the electrical workers' unions, an agreement, however, which is binding only on himself personally. It amounts to an understanding that he will call on union headquarters for electricians whenever the Civil Service Commission cannot certify eligibles, and that he will recommend to the Municipal Council the adoption of the scale of wages. It is, of course, not binding on the Council, but has been adopted and included in the Budget. The agreement is as follows:

This agreement, made and entered into this 12th day of June, 1905, to become operative this 12th day of June, 1905, between the Department of Electricity, City of Chicago, William Carroll, City Electrician, party of the first part, and Local Union No. 9, International Brotherhood of Electrical Workers, party of the second part; said agreement to be binding on both parties until the 12th day of June, 1906.

1. Eight hours shall constitute a day's work, between the hours of 8 a. m. and 5 p. m. In case of emergency, journeymen shall work as long as physically able, and if there are not enough Union Men available to work, they shall work with other journeymen.

2. Eight hours shall constitute a day's work for all classes except the employees who are paid by the month.

3. All time over eight hours per day shall be paid for at the rate of time and one-half, and shall be designated as overtime. Sundays and legal holidays, when work is performed, shall be paid for at the rate of double time. New Year's, Lincoln's Birthday, Washington's Birthday, Decoration Day, Fourth of July, Labor Day, Thanksgiving

---

[1] Report, Civil Service Commission, 1905, p. 25.

and Christmas shall constitute the legal holidays; time for not less than one-fourth of a day shall be allowed when a man is ordered to report for work, and that there shall be two regular pay days each month.

4. The Minimum rate of wages shall be as follows:

For Journeymen Linemen, per hour......	$0.42½
For Underground Linemen, per hour......	.37½
For Cable Splicers, per hour.............	.56¼
For Cable Splicers' Helpers, per hour.....	.37½
For Repairmen, per month...............	83.33
For Dynamo Tenders, per month.........	83.33
For Foremen, per month.................	110.00

5. Journeymen shall furnish climbers and belt tools, consisting of pliers, connectors and screw drivers, at all times. The Department shall furnish all other tools required.

6. Not more than one laborer or helper to four journeymen shall be employed at any time. Helpers shall not be allowed to finish work in any branch, until after they have served an apprenticeship of two years, and then only under the direction of a journeyman.

7. Civil Service certification shall be a sufficient necessary guarantee of a journeyman's ability to perform the work required of him.

8. In the event of an increase of journeymen employed by the Department, or the putting on of "sixty-day" men, should the City Electrician apply to the Union for men and it be unable or fail to supply them within twenty-four hours, he shall be at liberty to employ any man or men, and the Union shall not interfere with such man or men on the work, he or they may have engaged for, but as soon as the Union can furnish Union Men they shall be given the preference.

9. This agreement shall apply to all Aerial and Underground line construction and reconstruction, and to the wiring of all fire, police and electric light stations.

10. Unless thirty days' notice is given in writing, that changes are desired by either party, prior to the expiration of this agreement, it shall continue in effect for another year, but should notice of desire of change be given, by either party, both parties hereto shall appoint an arbitration committee of two members each, said members shall appoint the fifth member of the committee, the decision of this arbitration committee must be rendered within six days from date of receipt of notice requesting change.

11. The property of the City shall be taken care of so far as possible.

12. Should any difference arise between the party of the first part and the party of the second part which cannot be adjusted between them, it shall be referred to a committee, to consist of three members, one selected by the party of the first part, one selected by the party of the second part, and the third to be selected by the first two, who shall constitute a committee to adjust the said differences, and while this difference and matter is pending before said committee for adjustment, there shall be no lockout or strike, and the decision of the committee shall be final.

DEPARTMENT OF ELECTRICITY, CITY OF CHICAGO,
Party of the first part.
WILLIAM CARROLL,
City Electrician.
LOCAL UNION NO. 9, INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS,
Party of the second part.

....
.... *President.*
....
.... *Secretary.*
Committee.

Approved: F. J. MCNULTY,
Grand President.

A relic of the spoils system is found in the selection of laborers by wards. Each ward has an eligible list on which the position of each laborer is determined by lot, the only examination being a physical one. The Superintendent in need of laborers names the ward from which he wishes them taken, and the Commission certifies the first names on the eligible list of that ward. This enables those selected to work near their homes.

The Chicago Civil Service Law is unique in that it deprives the Superintendent of the power to discharge his employees. Even in the case of the first six months' probation the Superintendent must have the consent of the Commission and give in writing his reasons for removal. There has been but one case, however, in which the Commission refused approval. After the probation period of six months, if the employee is continued, his position is permanent, and he can be removed only by the Commission on charges formally presented by the Superintendent. He must have legal notice and is entitled to subpoena witnesses, and all testimony is given under oath and taken down in shorthand. The Superintendent or his deputy appears as prosecuting witness. Either side is permitted to have a lawyer to conduct its case. Members of trade unions are usually represented by officers or business agents of the union. In some of the police cases these trials have been as technical and formal as those of a court of law, but the usual practice is to admit all kinds of testimony that the commissioners will listen to. Appeals have been taken to the courts, but the Judges have always refused to review the evidence, and have not overruled the Commission except where the records do not show jurisdiction or that the defendant has not had notice. The view is taken that the Commission is an administrative court designed to secure efficiency in the departments, and the commissioners are entitled to any testimony they think will help them to make up their judgment.

It is an interesting fact that the heads of the Electricity and Water Departments cordially approve of the provision that takes from them the power of removal. This provision has been omitted from all other laws of the kind, owing to the opposition of heads of departments, and on the ground that it would break down the discipline of the department. But in these departments such a result, according to our information, has not followed; rather has the discipline, or at least the willingness, of the employees been improved, because they are fully protected from hasty and unjust discharge. They realize that their merits will have ample opportunity of being brought in evidence to rebut the charges, and consequently there is no temptation to bring political or trade-union pressure on the Superintendent to retain them. The efficiency of the department is also improved, because the testimony brings out at times defects that should have been remedied. The publicity of these hearings, the inquiry into all the circumstances, and the evident desire of the commissioners to reach a just decision, are important features of the Chicago effort to relieve the departments of outside interference on behalf of employees. While one case was noted by the investigators in which the obstacles in the way of removing a man had protected him in a show of unnecessary impertinence, yet even in his case, which is a responsible financial one, his independence of outside pressure is a tribute to the efficiency in that respect of the Civil Service Law. One class of employees, namely, unskilled laborers, is not entitled to a hearing, but the Superintendent must state in writing his reasons for removal. On the whole, after careful investigation and inquiry, but one person was found who believed that employees are forced out of their positions unjustly. This was one of the agents of the Electrical Workers' Union, but his charges were contradicted by two other agents of the same union.

The question of a hearing before the Commission has been much discussed in Chicago, and the commissioners in their report for the year 1905 make the following statement (p. 12, 13):

> "The causes for which removals were made cover a wide range and demonstrated conclusively that it cannot be claimed that the hearings make too difficult the removal of an employee who ought to be separated from the service. . . . The Civil Service Commission in the City of Chicago occupies a unique position. Under the law it is charged, as it were, with a general supervision over the work of the City's employees. In carrying out the responsibilities placed upon it by the law, the Commission is aided by the acquaintance which it gains with all branches of the City's work. This acquaintance it has in part gained through the hearings that come before it. The charges come from every department and corner of the City's work, and each hearing is an opportunity for the Commission to become acquainted with that particular phase of the City's work."

On the whole, careful inquiry in the Water and Electrical Departments, and among citizens of various classes, failed to reveal any material violations or evasions of the Civil Service Law in so far as appointments are concerned. The elasticity required in the case of temporary and emergency appointments permits personal preference or influence to enter to a limited extent, but this has been so effectively bounded and guarded by the Commission as no longer to occasion criticism. An important result is seen in the fact that the political bosses are much more indifferent as to who is nominated for Alderman, since the position does not carry with it the distribution of patronage on behalf of the political "machine." Consequently the quality of aldermanic material has been much improved. Practically the only alleged field for patronage left to the politicians and Aldermen of Chicago is that of the public utility corporations. Several Aldermen, interviewed by the Record-Herald[1] after the electric ordinance had been passed on June 11, 1906, stated that they had found jobs for their constituents with the Edison and Commonwealth companies, and that "nearly all the boys in the City Hall do it." One of these Aldermen made a similar statement to Mr. George C. Sikes, Secretary of the Municipal Voters' League, and Mr. Sikes has stated the circumstance at the request of the investigator as follows:

> "In the last Aldermanic campaign the Municipal Voters' League supported James D. Bowler as a candidate for Alderman against Samuel

---

[1] Record-Herald, June 24, 1906.

O'Donnell. During the campaign I became well acquainted with Fowler. When the ordinance fixing rates to be charged by the Edison and Commonwealth Companies was up for consideration during the present year, Alderman Fowler voted for the ordinance and also to pass it over the veto of Mayor Dunne. In discussing the matter with Alderman Fowler in the City Hall one day shortly after the attempt to pass the ordinance over the veto, Alderman Fowler in explanation of his vote said he wanted to vote for the ordinance if he could consistently do so because the company had rendered him important favors. He said the company had put seventy-five men to work for him since he had been elected Alderman, and added that the demand for jobs was strong in the Nineteenth Ward, and an Alderman had to do what he could to help his constituents. Alderman Fowler made this statement voluntarily and frankly, and in all innocence as if he regarded it—as he doubtless did—the proper thing for Aldermen to get jobs for his constituents.

(Signed) "George C. Sikes."

The foregoing paragraph being shown to W. L. Fox, Secretary of the Chicago Edison Company, he replied: "While it is quite likely that we may have put some men to work for him (Alderman Fowler), I question whether the number runs as high as 75, unless, possibly, the men referred to were coal shovelers, in which case the statement may be true. I have no means of checking up the figures, so cannot make any specific comments on the matter."

Through the promotional examinations or the rules governing transfers, the Civil Service Law controls all positions except the heads of departments appointed directly by the Mayor and ratified by the Council. This works out differently in the Water Works Department and the Electrical Department. The Water Works is a bureau of the Department of Public Works while the electricity service is a department by itself. The Commissioner of Public Works is a political appointee, representing the policy of the Mayor. Under him are five bureaus, namely, Water, Sewers, Streets, Street Cleaning, and Maps and Plats. The head of each bureau is appointed only on promotional examination held by the Civil Service Commission, or by transfer, regulated by the Commission, from another bureau. The Water Bureau has a clerical head known as Superintendent, whose duties are limited to the assessment and collection of water rates. The engineering side of the bureau is in charge of the City Engineer, a Civil Service appointment, but since the City Engineer is responsible for the other bureaus of the Public Works Department it has been found advisable for him to restrict himself practically to the duties of a consulting engineer, and to place the several bureaus under the charge of assistant engineers. As Consulting Engineer his time is occupied with the plans of new construction for all of the bureaus, so that the Assistant Engineer of the Water Bureau is in reality the head of that bureau in all of its branches except the collection of rates. The present engineer was transferred from the Sewers Department, where he had achieved a national reputation in the construction of the intercepting sewers by day labor.

While an assistant engineer under Civil Service rules manages the Water Bureau, the electricity service is a separate department, and the Chief Electrician is appointed by the Mayor and confirmed by the Council. Thus the position is political in theory, but it has not been so treated in practice. The present Chief Electrician has been in the electrical branches of the city service for thirty-three years and has been advanced through all grades until he reached his present position in May, 1905, at the time when his predecessor was promoted to the position of Electrical Engineer of the Sanitary District of Chicago, a body independent of the local city government. He is the third chief since the creation of the municipal undertaking, his predecessor having held the position for eight years. All of his subordinates are Civil Service appointees.

Wages. In fixing wages for municipal employees the head of the department and the Mayor draw up a budget specifying the rates of pay, and this is submitted to the Finance Committee of the Council. These rates hold for the ensuing year. At the time when the budget is being prepared it is customary for the agents of the trade unions to appear before the head of the department or the Mayor and present their schedules of union wages, and if an agreement is reached they appear also before the Finance Committee if necessary. The Comptroller refuses to audit bills for wages or salaries unless they conform to the schedules set out in the ordinance as passed by the Council. The policy of the Council is to pay trade-union rates, but disputes arise over details, and these are discussed in the way mentioned. The budget is finally passed by the Council in April, and cannot be changed until the following April, so that it sometimes happens that a union secures an advance from private employers before it does so from the Council. There has, however, never been a strike in the Electricity or Water Departments. The hours are uniformly eight per day, even though corresponding workmen are employed nine or ten hours elsewhere.

In the following table the wages and salaries of employees of the municipal Electricity Department and the two private companies have been reduced to the rates per hour. It is not practicable in all cases to draw comparisons, because in the private companies the force is much larger, amounting for these two companies to six times as many men as there are altogether in the four municipal undertakings investigated. On this account the work is to a greater degree specialized. This is seen in the case of operating engineers, where in the private plants each engineer is assisted by engine oilers and oil attendants who are lacking in the municipal plant. Some of these oilers, receiving 25 cents to 32½ cents an hour, have engineer's licenses, and they are claimed by the engineers' union, whose scale is 37½ cents an hour for eight hours, as paid in several private establishments and the Water Department. The company says that while some of the oilers have engineer's certificates, it does not make them any more efficient in their work as oilers; it simply puts them in line for promotion to the first opening as engineers. Another instance is that of linemen, who are paid $3.40 by the municipality and $3 by the companies for eight hours. The municipality observes the union scale of one helper or "ground man" to four linemen, while the companies have 55 "ground men" and "combination men" to 108 linemen and foremen, a ratio of one to two.

A similar case is that of wiremen, where the union ratio is one helper to five journeymen, but where the companies have 124 helpers to 171 wiremen, a ratio of 1 to 1.4. The union scale is $4.50 a day or 56¼ cents per hour, and this is paid to union men by the companies in the central part of the city, where the wiremen work with the organized building trades, but lower rates are paid elsewhere. This arrangement is a compromise resulting from a strike of the wiremen in which the companies defeated the union, but the union was successful where it had the support of the other building trades. There has also been a strike of firemen and oilers; and three strikes of linemen, resulting in advances in wages. Some union firemen are employed, and the linemen's union permits its members to work for the companies if they can get $2.95 a day.

The table shows the holidays with pay. There are 14 with the companies, and 10 with the municipality, but in both cases they apply mainly to men on the monthly or salary list and not to men on the weekly pay-roll. The policy of the municipality, however, is to place all of their permanent staff, even laborers, on the monthly list, so that five-sixths of the force get the ten holidays with pay. They also are entitled to twenty days' sick leave with pay, in addition to their vacation. The Edison Company has 307 of its 1,033 employees, and the Commonwealth has 234 of its 612, on the corresponding monthly or weekly list; so that in both companies about one-third of the employees are entitled to sick pay and two weeks' holiday with pay. In the municipal undertaking, the men are entitled to sick pay and holidays after six months' probation, and in the companies after the same length of service, if hired by the month, but not if hired by the day. Mechanics and laborers, including linemen, not on the monthly pay-roll, get time-and-a-half or double time, for overtime in the municipal plant, and under the private companies they get supper money, regular pay, or time-and-a-half.

Position.	Department of Electricity. (All Eight Hours Per Day.)			Commonwealth & Edison Co.'s.			
	No.	Wages (Per Hour).	Holidays and Vacations.	No.	Wages.	Hours Per Day.	Holidays, Vacations.
Chief Engineer	1	$2,500 per yr.	10	1	$3,000 per yr.	..	14
Assistant Engineer	1	1,440 per yr.	10	1	3,000 per yr.	..	14
Operating Engineers	8	120 per mo.	10	7	$95 to $125	8	14
Engine Oilers	..	....	..	34	25 to 32½c.	8 and 9	..
Oil Attendants	..	....	..	3	18⅔c.	8	..
Dynamo Tenders and Wipers	5	40c. per hr.	10	7	25 to 28c.	8	..
Water Tenders	8	33c. per hr.	10	7	30 to 35c.	8	..
Firemen	24	36c. per hr.	10	19	25 to 31¼c.	8	..
Coal Passers	5	28c. per hr.	10	..	......	..	..
Boiler Room Laborers	..	....	..	77	*17½ to 25c.	10	..
Laborers	2	28 and 29c.	10	..	......	..	..
Laborers	2	25c.	..	..	......	..	..
Station Repairer	2	33⅓c.	10	..	......	..	..
Mechanics	..	....	..	33	20 to 39c.	9	..
Armature Winders	1	40c.	..	36	12 to 35c.	9	..
Linemen	5	47c.	10	..	......	..	..
Linemen	23	42½c.	..	77	37½c.	8	..
Linemen	3	39c.	10	..	......	..	..
Combination Men	..	....	..	13	31¼ to 34⅛c.	8	..
Ground Men	8	25c.	..	40	25c.	8	..
Ratio Helpers to Linemen	1 to 4	....	..	1 to 1½	......	..	..
Foremen, Linemen	3	$110 per mo.	14	31	$85 per mo.	8	14
Arc Lamp Trimmers	56	36c.	10	73	18 to 32½c.	8	..
Arc Lamp Trimmers	24	30c.[1]	..	..	......	..	..
Arc Lamp Repairers	4	40c.	10	10	22 to 40c.	9	..
Wiremen	..	56¼c.	..	171	31 to 56¼c.	8	..
Wiremen Helpers	..	25 to 37½c.	..	124	19 to 28c.	8	..
Foremen, Wiremen	..	62½c.	..	8	47 to 60c.	8	..
Assistant Foremen, Wiremen	..	62½c.	..	9	37½ to 54c.	8	..

---

[1] Probation.

* The company states that of the 252 laborers it employs, less than one-fourth are paid $1.75 per day. The $1.75 men shovel coal over the sides of the cars. They are of a class that could not pass the city's civil service examination.

The welfare conditions provided by the Chicago companies in their new station at Fisk Street are the best that have been found in our investigations. There is in a large separate building (the plant of the high tension switching apparatus) an upper floor fitted up for the accommodation of its employees when taking their meals, enjoying their moments of rest, or cleaning up after work. The appointments in this fine structure, itself situated conveniently to the power house, are of the grade of those to be expected in an up-to-date hotel. The dining room is large, light, and well aired, its tableware better than that of the average restaurant, while the cost of a full meal is 25 cents, which the steward says is served at a loss to the companies. The day of the investigator's visit to the station eighty-three men had taken dinner at the restaurant. Beyond the dining room are rooms for lockers, further are wash basins, with soap and plenty of clean toweling. A fireman or coal passer may wash up, shave himself, hang away his working clothes, put on his street suit, and go and mingle with carefully attired persons as one of them. In all the bath rooms mosaic flooring and polished marble walls are found, with the fittings usually provided in costly dwelling houses. There are also bed rooms where men detained during emergencies may sleep under conditions of comfort and cleanliness. In a library hall, spacious and well lighted, fifteen to twenty of the leading engineering magazines are kept on file, technical volumes are on the shelves, and in folders or on the walls are sketches and drawings showing the design and arrangement of the intricate apparatus and connections in the power house. At the general office building of the companies, in the heart of the city, is a library containing the engineering journals of America, some of the popular monthly magazines, and dictionaries, atlases, encyclopedias, and 600 volumes relating to engineering. The privileges of this library are extended to every class of the companies' employees, office men, station and sub-station operators, linemen, and others. The hall is open from morning until 10.30 at night, and any employee may take books home. Regular monthly or semi-monthly meetings are held by some departments and sub-departments, talks or lectures being given on subjects connected with the work of the men attending, with illustrations on the blackboard or by the stereopticon, or various kinds of apparatus being placed on exhibition. Heads of departments give instruction on such occasions, and invite discussions of the subject presented.

Cleveland. Until three years ago, the so-called "federal system" of city government prevailed, according to which the Mayor appointed the heads of departments. In 1903 the change was made to the present system, in which a Board of Public Service, consisting of three members, is elected every two years at the polls, along with the Mayor. The Water Works is a division of the Department of Public Service, and the Superintendent of Water Works is appointed by the Board; whereas formerly he was appointed by the head of the Department of Public Works, who, in turn, was an appointee of the Mayor. Practically this change in the form of government brought no change in the personnel of the departments, because the present Mayor, who has held the office since 1901, has been able to secure his own renomination and that of his heads of departments in the Democratic primaries and conventions.

The Mayor is presiding officer of the City Council and has a veto over that body, but a two-thirds vote overrides the veto. The Council's consent is required for the budget of the Water Works as well as other departments, but the administration is entirely in the hands of the Board of Public Service acting through the Superintendent. During the term of the present Mayor, the franchise corporations of Cleveland have not taken an active part in the election of councillors, and the President of the traction company has achieved a national reputation by the stand he has taken against granting passes to councillors and officials, against employing men on their recommendation, and against aiding them in their primary and election campaigns. He has recently, on acquiring the Syracuse traction system, put a similar policy there into force. His largest expenditures towards influencing the votes of councillors are made through appeals to the public in the advertising space of the newspapers.

The Mayor, at the time of his first election in 1901, promised the voters that he would take the Water Works "out of politics." Prior to that time it had been the custom to retain the Superintendent, the heads of departments, and some foremen, but to remove ninety per cent. of the employees on the occasion of a change in the party at election. The present Mayor did not find it practicable for the first few months to reverse this policy, and appointments were made in the Water and other departments with the object of securing a Common Council friendly to his plans of municipal ownership. This was done at that time in the Water Department, and continues to be done to a certain extent in the Street Department, in order to hold the support of the political workers who are influential in the primaries. In several cases, however, the Mayor has openly taken the field in the primaries and opposed the nomination of councilmen whom he alleged were supported by the private corporations, and the success of this method has led him to extend the policy of refusing to use the departments for the assistance of political workers. The first department in which he put this policy into complete effect was the Water Department, on the occasion of the appointment of the present Superintendent, five months after his first election as Mayor. The Superintendent, selected by the Mayor, was assured absolute control of the whole department so far as the appointment and dismissal of employees was concerned, and was appointed with the understanding that he should endeavor to keep himself in ignorance of the politics of everybody that was appointed, removed, or promoted. This independence has continued to be exercised under the changed form of government, the Board of Public Service, although it has the power of confirmation and rejection, always ratifying the acts of the Superintendent in matters of employment. Consequently, although he has in law only the power of recommendation, his recommendations in practice are equivalent to appointment, removal and promotion. At one time during his period of office as Superintendent there was a serious attack on the part of influential politicians against this policy of excluding political appointments. This was occasioned by the defeat of the Mayor in his candidacy for Governor of the State. It was claimed by them that his defeat, at least in Cuyahoga County, was due to the fact that the political workers were deprived of the help of the police and the Water Department, and the Superintendent's removal was demanded. Two-thirds of the Council turned against the Mayor, and obstructions were placed in the way of payment of bills. Investigations were ordered, but these brought out such indorsement of the administration through the newspapers and public opinion that the support of the Council was ultimately recovered. The principal effect of this attack on the political independence of the department was seen in the primaries, where the nomination of candidates was largely in the hands of politicians, but when it came to an election the independent Republican vote, which has rapidly increased in Cleveland, supported the Mayor and his policy in the Water Department.

One feature of the effort to exclude politics is the notification given by the Mayor to the public that no question of wage adjustment shall be taken up within two months before an election. The policy of the Department with reference to trade-unions and wages has been entirely in the hands of the Superintendent, whose acts have been ratified when necessary by the Board of Public Service. He has always received committees of the unions and taken up with them any difficulties that they raised. He has told them that if they could show that any employers in the city paid higher wages or gave shorter hours, he would conform to that standard, and would even go a little farther, by paying as much for eight hours as other employers paid for nine. He would not agree, however, to recommend to the board the payment of quite as high wages for eight as might be paid elsewhere for ten hours. In some cases that is done, but it is not agreed to as a settled policy.

On receiving an appointment a man is paid less than the maximum permitted by the annual appropriation, and his salary is advanced according to his improvement in efficiency. The Superintendent attempts to surpass almost every other firm in sanitary conditions and other matters involving the comfort of employees. Since a large part of the street labor is season work and the stations are far apart, there is little opportunity for some features of welfare work. The offices are ventilated by forced draft through the floor, and the toilet facilities are unusually well cared for. In the basement are bathrooms for those of the working force reporting at the office. In case of accident to workmen the city looks out for first aid and provides beds at the public hospital.

The trade-unions after some discussion have tacitly, if not avowedly, accepted the position of the Superintendent respecting wages. In some cases they showed that on his basis wages should be raised, and when the Superintendent had by independent investigation satisfied himself of the truth of this claim he raised the wages. The claim, however, often successfully maintained, that wages were very much higher for similar work in Chicago or other city departments elsewhere, was not allowed to count.

Most, and possibly all, of the stationary engineers at times have been union men. In the case of foremen there have usually been several non-union men, and this has also been true of some of the mechanics. Where the department has employed men in the building trades, however, they have employed union men where skilled work was required. In the pipe laying and repair gangs they are all non-union. In meter setting gangs there was a question at the start in 1901 as to whether the division should use plumbers to set the meters or ordinary handy men. Despite the opposition of the plumbers, both master and journeymen, the meters were set with handy men on the ground that very little of the work had to do with lead, but was common labor with some mechanical skill. The Superintendent has run against the plumbers' organization in another way within the last eighteen months by employing a patent coupling of brass in welding or uniting two pieces of lead pipe, or a lead and iron pipe, instead of having a wipe joint, which is done by plumbers. This method was more economical and has been in extensive use by the water division. A committee of the master and journeymen plumbers claimed that the new device was not as strong as the wipe joint of lead. Tests were made in their presence and their claim disproved.

Another contest arose over not employing members of the bricklayers' union to lay the bricks in the meter vaults which are often placed at the curb. The Superintendent told them that he required only about two or three hours' work a day of that kind in even small gangs, and would employ a member of the union at regular bricklayer's pay, which is from 50 to 60 cents an hour, if he would appear whenever wanted, and work by the hour, but they thought that was impracticable, and accepted the theory that he had better employ his own handy men at 25 cents an hour working under a foreman and doing other work as readily as bricklaying.

The general question of union *vs.* non-union labor has not been raised. The Superintendent has held that a city could not insist on every employee belonging to a union, but was friendly to unions and was willing that they should use every effort and moral suasion to get the men to join. Although he maintains that city employment must necessarily be on the "open shop" basis, yet in certain of the building trades, where it is common in private business in the city to employ only union men, he does the same.

One of the two greatest difficulties arose over contractors who had obtained large contracts for erecting certain portions of the new pumping station at Kirtland Street, and who employed non-union men exclusively. No contest was made until these contractors began the erection on the water works property of the material which they had made in their own works. Difficulties then arose with three contractors. Two of them solved the problem by subletting the erection to agents, who employed union men for that purpose. One of the two did not yield until some of his non-union men were forcibly interfered with. The Superintendent secured police protection, but the contractor finally thought it wise to sub-let, and he was urged to do so for the sake of peace. In the third case the contractor, who elsewhere employed non-union men, had union men on the job, with a foreman who had formerly been a member of the union of steam fitters and had had trouble with them. The union men were withdrawn from the job, and when non-union men took their place every other union man engaged in the construction of the building went out on a strike. In two or three days the contractor of the steam fitting withdrew his men and the union men went back to work. In about two weeks the contractor of the steam fitting and the union involved met in the Superintendent's office, and he arranged a treaty of peace between them, which was satisfactory to both sides and resulted in the contractor's employing only union men everywhere.

The only trouble had directly with employees in a body has been with the members of the tunnel workers' union, who were employed to the extent of about twenty-five or thirty in the construction of the water tunnel under Lake Erie. The men had been voluntarily given four hours' labor at their old pay when the air pressure was very high, and they refused to return to eight hours when the pressure was reduced. They struck, and after waiting two or three weeks, the Superintendent employed non-union tunnel workers. The Bricklayers' Union thereupon struck, and he secured non-union bricklayers. Then the United Trades and Labor Council, without investigation, voted that the city was on the unfair list. Finally, the Superintendent went before the Labor Council and induced it to appoint a conference committee, which met with the Mayor and himself and learned that the city's terms were better than were secured by tunnel workers in any other part of the United States, or probably of the world. The city made a concession in one point of the proposition, and the conference committee reported to the United Trades and Labor Council somewhat in its favor.

Soon after, a member of the Executive Committee of the International Machinists' Union, employed by the Water Works in a responsible position, induced the Tunnel Workers' Union to accept the city's terms. They went to work in one tunnel while the non-union men continued at work in the other, and the bricklayers went to work with both gangs. The Superintendent discharged no non-union men that he had hired, but took back all the union men that desired to come. He had no more trouble. This was in 1902. The difficulties with the contractors occurred in 1902-3. During the last two years the only labor difficulty has been the slight one mentioned above connected with the use of the patent coupling for lead pipes.

There is at present no question up for discussion between the Water Division and the unions, and wages, hours and conditions are satisfactory to organized labor. The unions represented in the department are stationary engineers, firemen, carpenters, machinists, plumbers, pipe-layers, meter setters and at times pavers and bricklayers. There is no laborers' union in Cleveland, though the central body has at times taken up the question of wages for the unskilled and has reached a satisfactory settlement with the department.

Syracuse. The Bureau of Water, Department of Public Works, is operated under the New York State uniform charter for cities of the second class (Chapter 182, Laws of 1898). The Mayor, whose term is for two years, appoints the Commissioner of Public Works, also for two years, " unless sooner removed by the Mayor." The Commissioner of Public Works appoints the Superintendent of Water Works, who " holds office during the pleasure of the Commissioner." Though there is a standing committee of the Common Council on Water and Fire Departments, it has no control whatever over the Bureau of Water.

The design of those who formed the uniform charter law was to deprive the Council of administrative authority, and to restrict it to what is understood to be legislative acts. The budget for the several departments is drawn up by the Mayor and the Board of Estimate and Apportionment, and is submitted to the Council, which may cut down items but may not increase them. The Mayor, through his Commissioner of Public Works, is the final authority in managing the Water Bureau within the budget limits. Since the Commissioner of Public Works has several bureaus under his jurisdiction there is provided a subordinate officer, the Superintendent of the Bureau of Water. The arrangement is similar to that in Chicago and Cleveland, but in this case the Commissioner does not intrust the Superintendent with the full responsibility of administering his bureau. Appointments, promotions and removals are made directly by the Commissioner under the civil service law without consulting the Superintendent. He decides when and how many laborers are to be employed and which men are to have vacations or sick-leave. The Chief Inspector of the Bureau reports and makes recommendations directly to him. Since the Commissioner's time is taken up also with other Bureaus, the result in the Bureau of Water is a divided authority and considerable friction. The Superintendent occupies practically the position of a clerk, although there is a Chief Clerk and staff not subordinate to him. His position is supernumerary. The present incumbent is an attorney-at-law, formerly a member of the State Assembly, and he is influential in the politics of his ward. The Commissioner is recognized as the leading representative of the Republican party organization in the city. Through him the assessments are collected from officials and subordinates. While these payments are spoken of as "voluntary," yet every employee of the Water Bureau pays the amount which is suggested to him by the collector, namely, 3 per cent. on salaries under $1,000, and 5 per cent. on salaries over $1,000. This assessment is said to yield about $20,000 from all departments. The practice has been in vogue throughout the entire administration since the uniform charter law went into effect in 1900, being enforced by the Democratic organization prior to 1901 and by the Republican organization since that year. A large proportion of the employees have held over from the Democratic administration, and they have paid assessments to the Republican organization. Some of them have taken part in Republican primaries and as delegates to conventions. In addition to assessments from municipal employees, both organizations receive contributions from private persons, but not from corporations, since the state law prohibits contributions from that source. The effect of the law is seen in the fact that at the mayoralty election of 1903 two Democratic directors of the lighting company contributed $2,000 to the Democratic Committee. Members of the Republican and Democratic committees have been connected with the lighting and traction companies, and prior to the present year a majority of the motormen and conductors got their places on the recommendation of mayors and councilmen. One alderman who has served the past three years has placed a dozen and a half men on the street cars. This practice was stopped about a year ago when the traction system was sold to an outside syndicate, and the new president changed the policy of the former manager by declining to appoint men on the recommendation of politicians. He also stopped the practice of furnishing free books of tickets to aldermen and others of political influence.

There is a perfect agreement of politicians of both parties interviewed, that a large proportion of the voters in certain districts is purchased election day. Votes are bought for $2 to $5, and the practice is found among all nationalities.

The present civil service law did not practically apply to Syracuse until Jan. 1, 1899. The first Commission consisted of seven members and a Secretary, appointed by the Mayor. The commissioners conducted examinations and passed up all of the political appointees named by the Mayor. In 1900 the State Civil Service Commission, under its power to annul local by-laws, conducted an investigation in Syracuse with the result that the rules were changed and a Commission of three members and a Secretary was named by the Mayor. The State Commission stipulated that there should also be created the position of Chief Examiner, and that the incumbent should be selected by means of an examination held by the State Commission. This was done, and the present examiner was selected, and has held his position since that time, although the commissioners have been entirely changed through changes in politics. The pay-rolls of all departments under the Civil Service Law must be certified by the Secretary of the Commission, else their payment by the City Treasurer is illegal. Prior to 1906, the Secretary, an unsalaried official, had not kept records, and he could not certify the pay-rolls with certainty that the appointments were in conformity with the Civil Service Law. In January, 1906, as a result of a second examination by the State Commission, the positions of Secretary and Chief Examiner were consolidated, and the Examiner was made Secretary. Consequently that loop-hole has been remedied. The competency of the Chief Examiner and "his earnest desire to render the best service possible in his position" were strongly indorsed by the State Commission.

The Examiner not only sets the question papers, but passes upon the applicants and grades their standing. He and the commissioners can be removed at any time by the Mayor without giving reasons. On the other hand, the examination papers are public property and can be examined at any time by the candidates. The State Commission, on its investigation in 1905, reported that the papers had been "rated with care and good judgment," and that "on the whole justice has been done the candidates."

The three highest names on the eligible list are certified to the appointing officer by the Secretary, and he may appoint any one of the three. The appointing officer can remove any subordinate without filing charges or giving reasons. Under this system there have been appointed five meter readers since March, 1902. The examinations held that month resulted in 15 eligibles who passed, and the appointing officer selected numbers 1, 3, and 4, omitting No. 2, who then was dropped as being certified three times. Another examination was held February, 1904, and of the four applicants who passed numbers 2, 4, and 3 were appointed in the course of two years, omitting No. 1. At the end of one year the appointing officer can call for a new eligible list. In the Water Bureau, of 41 persons covered by Civil Service rules, there are at the present time 9 who have been appointed during the five years since January, 1902, under two Republican mayors, and all of these appointees are Republicans. There are 19 who were appointed during the preceding 6 years under a Democratic Mayor, and there are 13 who were appointed during the first three years of municipal ownership—1892 to 1894. One of these, the present Chief Inspector, was employed by the former private company at the time when the works were taken over. Of the 11 men whose salaries are $900 and over, 7 were appointed prior to 1896.

The Civil Service Law requires the registration of laborers and their appointment in the order of registration. This provision has been a dead letter since the first trial. At that time, some 1,500 laborers were registered, and more than 60 per cent. of them were over 50 years of age. The appointing officers evaded the law by appointing those certified and immediately removing them before they were placed on the pay-roll. Since that experience, this feature of the law has not been enforced. Consequently there is an average of about 30 employees illegally exempt from the law, and about 75 when the force is at its highest strength. These are selected on political qualifications.

One feature of the law, amounting to a defect from the standpoint of efficiency, is the preference for war veterans irrespective of their standing in the examination, provided they pass the minimum grade. This reduces the number of applicants, who drop out when they learn that a veteran is among them. Another reason is the prevailing opinion that only those on the political side of the administration can get and hold positions. The Civil Service Law, in fact, affords no protection to subordinates against a Mayor and Commissioner of Public Works determined to use their positions for political ends.

In one respect the Bureau shows improvement during the past five years. At the time in 1899 when by the uniform charter for second class cities the Water Board was abolished, the Mayor, through his Commissioner of Public Works, inflated the pay-rolls of the Water Bureau, so that in January, 1902, there were 70 civil service positions in the bureau. A change of administration, resulting from the election of 1901, in which this abuse was an issue, brought a reduction of the force, and the number at present is 41. The pay-roll for 1901 was $52,705, and for 1905 it was $35,791. In 1901 there were 7 meter readers for 8,592 meters, and in 1905 there were 8 meter readers for 15,923 meters, an increase from 1,227 to 1,990 per man.

At the time when the force was reduced in 1902 the salaries of seven officials and foremen were raised, the largest increase being that of the Chief Inspector who was advanced from $1,600 to $2,500. The other advances were $100 to $600. At the same time the salary of the Superintendent was reduced from $3,000 to $2,500. The only skilled mechanics regularly employed are two plumbers who belong to the union and get the union scale, and a carpenter who is not a union man and gets 30c. a day less than the scale. Other mechanics, such as painters, etc., appear only as employed by private contractors. The bulk of day laborers are Italians with citizen's papers at $1.50 a day. Hydrant and valve repairers are paid $1.75 a day, and watchmen $720 a year. The "prevailing rate of wages" law maintains the hours of labor at eight as against ten for unorganized labor in private employment. Under a decision of the State Court the prevailing rate has not recently applied to contractors doing work for the bureau, except as it has been enforced by trade-unions in the building trades.

Indianapolis. The company has not been prominent in politics and has followed the lead of the gas company. It prevented one of its engineers from becoming a candidate for the position of city engineer. It does not employ an extra number of workmen on the streets or at the plant, but has employed several men in labor positions on the recommendation of an influential Democratic committeeman. Leading members of the Council get free water unless they decline, and others less prominent get free service on request.

The Indianapolis water works has a canal, a filtration plant and pumping stations. Besides the classes of workmen at a gravity supply, the company gives employment to engineers, firemen and coal passers, with a complement of laborers at the stations and filtration works. Its summer laborers are mostly black; others are known as "Kentuckians," who perform much of the rough work in Southern Indiana towns. The company, on account of the negroes, employs no Italian laborers, who have not come to Indianapolis in large numbers. On the regular force citizens of Indianapolis are usually given preference, as they are familiar with the streets. Subordinates are engaged by the head of the department in which they are employed. The President has general charge, but particularly of construction work. The Vice-President has direct charge of the canal and filtration works, the Secretary of the office and the pumping department. The three highest officials are not of the same political party; the question of a man's politics never counts in making appointments. The day laborers are subject to discharge by their respective foremen. The latter have nearly all been with the company a long time—some of them twenty years—being promoted from the ranks. Few changes occur on the permanent staff.

The company is paternal in dealing with its employees, who on the average number 88 in the salaried force and 167 in the wage-working class. No man is employed in the office, at a pumping station or as a street foreman who drinks intoxicating liquor. The company gives free water to all the officers and the employees of the staff. At the end of each year it sets aside a certain percentage of the net earnings of the company for distribution among the regular salaried employees, including the engineers, firemen, oilers and wipers, and the regular men in the street department. In some cases the amount given takes the form of a cash bonus; in others of an increase in salary. While the company has no pension system something is always done for men who leave after a service of ten or twelve years. To a stationary engineer whose sight was becoming defective a small farm was given. Salaried employees when ill are kept on the payroll indefinitely, and in all cases of accident to employees the company pays medical expenses, and in instances of need has taken care of an injured workman's family. In dull times the company has never paid as low as the market rates. For the summer work it has the same men's names appearing on the payrolls year after year. All of the salaried employees who have served the company for one year are allowed from a week to ten days' vacation with pay. Promotions are from the ranks. There has been no lawsuit for injuries in years; settlement out of court is the policy.

The officials report no strikes as having taken place; they do not know whether their mechanics are union men or not; they have "open shop" and do not oppose organized labor; they pay off on the job, carrying the cash to the laborers, who are paid weekly. The officials contribute to a bowling club composed of the men. At the new pumping stations modern baths and toilet facilities are being introduced. At the pumping station and filtration works the employees work amid pleasant surroundings. The Stationary Engineers' Union in Indianapolis is in course of organization after falling away almost to the point of dissolution. There are not 75 union members out of the 625 engineers in the city running over 6-horse-power engines. Last year the membership ran down to 20 who had their dues paid. The union intended to reach a scale of $2.50 for an eight-hour day, but where one engineer now gets $15 for twelve hours' work a dozen get $10 or $12. The engineers at the water-works have not joined the union; their salaries run from $75 to $83.33 per month. The local firemen's union is no longer in existence; its scale had called for $60 for twelve hours. The firemen at the water works receive from $50 to $63.70 for the same service. The effect of negro labor on wages is to depress them in the classes into which the blacks enter. The city pays twenty cents an hour, eight hours, for common labor, for white laborers mostly. The lowest grade of street men of the water company, many of them blacks or "Kentuckians," are paid 17½ cents an hour for a ten-hour day. The smaller number in the higher grades of laborers run as high as 22½ cents an hour. The following table shows the wages and hours of employees:

Wages, Indianapolis Water Company.

	No.	*Max.*	*Min.*	*Average.*	*Hours.*	
					Day.	*Week.*
Engineers	17	$19.23	$15.38	$17.30	12	84
Firemen	11	14.00	11.52	13.22	12	84
Coal passers	7	....	11.55	......	..	..
Inspectors	7	14.71	9.00	11.81	10	60
Meter readers	2	14.71	12.84	14.27	10	60
Street department	11	20.30	9.00	13.40	..	..
Clerks	11	18.20	5.50	10.21	..	..
Laborers	167	.21½	.15	.18½	10 9	60[1] 54[2]

New Hands. The water works company employs one class of labor in its office, another at its filtration plant, and another on its operating and constructing force. A place in the office is obtained through the decision of the president, who in such matters may consult with his fellow-officers. The successful applicant may thereafter concern himself with his duties alone. The leading positions at the plant and of the out-door force—those of the civil engineers, stationary engineers, and the foremen—are also filled through orders from the higher officers. The Superintendent engages the pick-and-shovel men, nowadays mostly Italians. Several of the office force have been with the company many years; the pumping engineer at the Whitney pumping plant has been with the company thirty-five years, and half a dozen of the foremen have been with the company from ten to twenty years. The engagement of the force is not regarded by the company as such a public question as gives equal rights of employment to New Haven citizens. Hiring the gangs is thus simplified. The company's president relates that on several occasions they had compared jobs of street work done by their men with similar work done by the city, and that their work, equally well done or better, cost as much as 25 per cent. less than the city's, illustrating the benefits of a thorough system, good organization, and trained workmen. They never had brought to their notice any evidence of underhand dickering between the foremen and the men. The president said he believed that from top to bottom every man on the force stood on his efficiency alone in the performance of his duties. When the company wanted an employee in any department, the way was open for all applicants alike, influenced by such modifications as acquaintanceship or association membership naturally exerts, which is the case the world over.

---

[1] Summer.

[2] Winter.

(For further data and information upon these subjects see appendix to this volume.)

ENGINEERING MATTERS

United States Water Works

(Schedule III)

By DABNEY H. MAURY

II—CHARACTER OF SERVICE AND PLANT.

II 1. Data for year ending:

Chicago, Cleveland, Syracuse, Indianapolis, New Haven. December 31, 1905.

SOURCES OF SUPPLY.

II 2. What was the source or sources of supply?

Chicago. Lake Michigan, for all except Norwood Park pumping station, which pumped from wells. Washington Heights drew lake water from city mains, and pumped to tank and distributing system. The former village of Rogers Park, annexed to Chicago in 1893, was then, and still is supplied with water by the Rogers Park Water company. As the Rogers Park plant is privately owned and operated, it does not come within the scope of this investigation, which will deal only with the municipal plant of the city of Chicago.

All the water pumped by the city, except a very small amount drawn from wells in Norwood Park, is taken from Lake Michigan. There are five intake cribs, located from two to four miles from shore, and connected by tunnels to eight large pumping stations. Water flows by gravity through the tunnels to the receiving wells at these stations, there to be forced into the mains by pumps. The Washington Heights pumping station takes its water from a city main, and forces it into a separate system of distributing mains and a water tower. The rest of the distributing mains, except those in Norwood Park and except some mains in or near West Pullman supplied by a separate pipe from one of the pumps at Sixty-eighth street, are interconnected.

Cleveland. Lake Erie. There are two intake cribs in Lake Erie, the East Side crib and the West Side crib. Water from the latter crib having been condemned, all water pumped into the mains in 1905 was drawn from the East Side crib.

Syracuse. Skaneateles lake, in the counties of Onondaga, Cayuga and Courtland, in the state of New York. In the vicinity of Syracuse there is a group of five lakes, long and narrow in shape, separated by narrow ridges, and all approximately parallel in their general direction. These characteristics have caused the group to be known by some local geologists as the "Finger Lakes," and a glance at a topographical map of the region will at once show the aptness of the nickname.

Skaneateles lake, selected in 1889 by the city of Syracuse as its future source of water supply, belongs to this group. It is one of the most attractive of the inland lakes of the state. Over 15 miles in length by about a mile and a half in greatest width, its surface area is 12¾ square miles, the total area of the water shed including the lake being 70¼ square miles. The lake is very deep and its shores are steep and bold and unusually free from objectionable vegetable growth at the water's edge. There is practically no swamp drainage, the lake being fed largely by springs. Its watershed is sparsely populated, and its waters, naturally very pure, can be maintained so with intelligent care at a very small annual cost. The ridges surrounding the lake rise from an elevation of 150 feet above it, near its lower or northwestern end, into hills, which are a thousand feet higher than the lake near its inlet. The elevation of the lake is 867 feet above sea level, about 241 feet above the flow-line of Woodland reservoir, and about 461 feet above the Syracuse level of the Erie canal, which latter level is the Syracuse water works datum. The lake is estimated to be capable of supplying a city of 500,000 inhabitants.

The report of the commissioners on the sources of water supply (Exhibit 1, not reproduced here) gives much interesting information in regard to the lake, and sets forth the reasons for its selection as the future source of supply for Syracuse.

Indianapolis. Water from deep wells and filtered water from White river and from Fall creek.

The Indianapolis water company has at present several sources of supply. By far the larger portion of the water which it pumps to the city is filtered water from White river. The company owns what is known as the White river canal, an open channel about nine miles long, 60 feet wide and 7 feet deep. This canal taps White river just above the Broad Ripple dam, which is also owned by the water company, and conveys water from the river to the company's old pumping station, situated on the east bank of White river and just south of Washington street, at A, Plate 1 (not reproduced here). Here some of the water power developed by the canal is used to operate pumps, and some is sold to neighboring industrial establishments. No water is taken from this part of the canal for city supply.

About two miles above the lower end of the canal there is an intake which admits water from the canal to the recently constructed filters, which are located at B, Plate 1, and which now furnish most of the water supplied by the company.

Duplicate steam pumping units at the filter plant enable water to be pumped into the filters from Fall creek, but except in case of interruption of the supply from the canal the Fall creek water is rarely used. The filtered water flows by gravity to the receiving well in the new Riverside pumping station at C, Plate 1.

A second source of supply utilized by the water company was the fissured limestone, referred to elsewhere, in which there are 28 driven wells, averaging 325 feet deep, sunk in the land surrounding the Riverside station.

A third source of supply, and one which has in the past given rise to some controversy, was the so-called open gallery reservoir at the Riverside station, through the porous soil in the unlined bottom of which a small amount of ground water enters from the upper gravel stratum when the reservoir is lowered by pumping.

By means of a thirty-inch conduit leading from the new station at Riverside to the old station south of Washington street, either filtered water or well water or both may be pumped into the mains at either or both of the stations.

In addition to the sources of supply already mentioned, there is at each station an emergency intake through which water from White river may be drawn by the pumps. The gates controlling these intakes are kept closed and sealed by the Indianapolis board of health, and the seals may not be broken except in the remote event of the failure of all other sources of supply to equal the actual requirements.

EXTRACT FROM EXHIBIT 1, pp. 4-5.

"At the time when this commission was appointed, the public water supply of Indianapolis was derived from a series of deep wells, the flow of which was supplemented at times by water coming by seepage into the galleries adjoining the Riverside pumping station. Prior to the new filtration works going into service in part on September 23, 1904, there was no change in the source of supply other than the addition of five deep wells, since 1898, when a comprehensive report on this subject was made to the city by Mr. John W. Hill, then of Cincinnati, but now of Philadelphia. The question of the yield of the wells and the galleries, with reference to the quantity of water delivered to the city, is taken up beyond, as is also the case with the new filtration works. Here it is the purpose to describe briefly the leading features of the supply utilized for the past seven or eight years, in order to make more intelligible the analytical investigation.

The well supply is obtained at present from 30 deep wells, ranging in depth from about 275 feet to 400 feet below ground surface. Five of these wells are 8 inches in diameter and the remainder 10 inches. The casings of the wells appear to enter the rock in a manner so as to shut out the ground water which might enter them at rock level. The water from these various wells is lifted by compressed air and discharged into the galleries adjoining the pumping stations. From the open gallery the pumps at the Riverside pumping station take the water and deliver it directly into the city, while a gravity conduit allows a part of the water from the open gallery to flow to the suction well of the West Washington street pumping station, whence the remainder of the water is pumped directly into the distributing mains.

No change has been made in these galleries since Mr. Hill's report other than that the severe flood of last spring caused the wooden roof over the gallery reservoir to be washed away, at the same time causing portions of the side walls to fall in, allowing more or less earth to become deposited upon the bottom of the reservoir. Briefly, and in round numbers, this gallery reservoir is about 850 feet long, with a width ranging from 40 to 65 feet at different sections. It allows an average depth of water of about 11.4 feet. The bottom is unlined. When full it has a capacity of about three and one-third million gallons.

At the northwest end of this reservoir, referred to in this report as the "Open Gallery," there is a tunnel connecting it with the so-called closed gallery, which is a covered timber structure about 1,000 feet long. There are several feet of earth and coarse sand above the top of the roof. At the river end is a gate chamber in which there is a wooden sluice gate, separating the gallery from the connection to an abandoned filter crib on the bed of the river about 48 feet long and 12 feet wide. This gate was renewed under the inspection of the city board of health about two years ago. This gate and the ones preceding it were sealed by the city board of health, and have not been used. About midway of the length of the closed gallery there is another gate chamber in which is placed a wooden sluice gate, generally called the "safety gate," which has never been sealed, and which from time to time has been opened.

The location and arrangement of these galleries, together with location of the intake pipes, through which the water is taken for the suction of the various pumping engines, is shown upon Plate No. 1 (not reproduced here). * * * On this and another plate there are noted the suction wells on the pumping station grounds, into which filtered water is at this date being delivered through the conduit leading from the filtration works, and through which water may be taken by the suction pipes leading to the several pumping engines, and from which also the water may be delivered into the gallery reservoir.

There is still another connection at this so-called suction well which will enable the filtered water to be delivered through a thirty-inch pipe line (now being constructed) into the conduit line leading from the Riverside pumping station to the lower station, situated near West Washington street at the foot of the canal.

On Plate No. 2 (not reproduced here) are marked several sampling stations as a matter of convenience in showing from which samples were collected during this investigation. There are also given as a matter of record the elevation of various structures, together with the high, low, and ordinary stages of water in the White river adjoining the water works."

New Haven. Nine lakes, as follows.

(1) Whitney,
(2) Saltonstall,
(3) Dawson,
(4) Bethany,
(5) Chamberlain,
(6) Wintergreen,

And the three Maltby lakes, Nos. 1, 2 and 3.

For principal data in regard to lakes, see Plate II (not reproduced here).

The nine lakes which furnish water for New Haven are all of unusually great natural beauty, and the attractiveness of their surroundings has been much enhanced by the water company, which has adopted the most approved methods of cleaning, protecting, and beautifying their shores. With the exception of Lake Chamberlain all of the lakes are shown on Plate I (not reproduced here). Chamberlain is on a branch of Sargent river to the westward of Lake Bethany, and just beyond the limits of the map.

The capacity, surface area, elevation of each lake, and the area of its watershed are given on Plate II (not reproduced here).

The watersheds of all the lakes are hilly, and, with the exception of Lake Whitney, are wooded and wild and very sparsely populated. The shores of the lakes are generally steep and often rocky, and there is practically no swamp drainage into any lake, except that from an area tributary to the lower end of Lake Saltonstall, where part of a swamp lying between Cherry Hill and Lake Saltonstall is drained by a small stream which is tributary to the lower end of the lake. That part of this swamp which drains into the lake is now being cleared by the company.

(Sec. II 56.) The combined area of all the present watersheds is 57.7 square miles, of which the Lake Whitney shed covers 37.7 square miles. It is not reasonably possible for the company to secure all the land in the watersheds, and especially is this true of the Whitney shed, some of which is very valuable land; but the company now absolutely owns about 7,000 acres for the protection of its supply, or a little over half of the watersheds of all the lakes except Lake Whitney, and is buying more whenever it can. The water from Lake Whitney, which is much more liable to pollution than any other by reason of the number of people living on its watershed, is now filtered before it is supplied to the city, the filters having been started early in 1906.

Lake Bethany on West river and Lake Chamberlain on Sargent river impound water which is allowed to flow as needed to Lake Dawson, whence it is distributed by gravity to the city. Maltby lakes Nos. 2 and 3 impound water which is used as required to replenish Maltby lake No. 1, from which the distribution is also by gravity to West Haven and the western part of New Haven.

Lake Wintergreen, which is at a higher elevation than the other lakes, supplies only the highest parts of the city, including the Prospect Hill district. The supply from Lake Whitney (now filtered) is pumped either into the mains or into Prospect Hill distributing reservoir at an elevation of 125 feet above city datum.

The water from Lake Saltonstall is pumped first into a standpipe about 800 feet from the pumping station and at an average elevation of about 162 feet, whence it flows by gravity into the East Haven distributing reservoir, elevation, 142 feet.

H 3. If there was more than one source, give approximate amount supplied by each.

Chicago. Lake Michigan, 135,567,897,536 gallons; wells at Norwood Park, 21,045,000 gallons.

Cleveland. There are three pumping stations, respectively known as the Kirtland street, Division street and Fairmount stations.

Kirtland street station, supplied by the East Side crib, pumped into the low service system of mains and the low service reservoir at Fairmount the entire city water supply. A small portion of this water was repumped at Division street by a pump which took its supply from the low service mains and delivered it into the high service mains and the high service reservoir at Kinsman street; while another small portion was repumped at Fairmount by pumps taking water from Fairmount reservoir and forcing it into high service system and Kinsman reservoir.

The total net amount, after deducting estimated slip, pumped into low service by Kirtland street station in 1905 was 21,040,200,000 gallons. This amount represents the entire supply to both low and high service. The net amount repumped at Division street from low service mains to high service was 2,006,600,000 gallons. The net amount repumped at Fairmount station from Fairmount reservoir into high service was 312,536,000 gallons.

Syracuse. The thirty-inch conduit, 19.29 miles long, delivered by gravity from Skaneateles lake into Woodland reservoir about 4,507,750,000 gallons, according to water department estimates. There is no other source of supply. The amount of 4,507,750,000 gallons is taken from the official estimates of consumption on P. 12 of annual report of bureau of water for 1905, the amounts for the five months omitted in the department's estimates begin calculated from such data as were available. The correctness of the figures are to some extent open to question as the capacity of the conduit has never been accurately measured. For estimating the discharge of the conduit, the department uses an empirical formula in which the determining factor is the difference between the elevations of the water in the gate-chamber and in the screen chamber of the lake gate house when gate No. 1 between these two chambers is left open 15 minutes. From February 15 to April 18, 1905, this gate was left open 20 inches, and as there is no formula for estimating the flow with the gate at 20 inches, the estimates are missing for that period, and as, during a portion of the night, the reservoir overflowed in October, November and December, the estimates for those months also are not found in the annual report for 1905. It is probable that the consumption slightly exceeded that reported.

Indianapolis. Unfiltered water from wells, 2,041,000,000 gallons. Filtered water from White river and Fall creek, 4,089,000,000 gallons.

New Haven.

Allowing for slip, pumped from Lake Whitney.	3,052,000,000 gals.
Pumped from Lake Saltonstall........	1,320,200,000 gals.
By gravity from Lake Dawson (including lakes Bethany and Chamberlain tributary to Lake Dawson)........	2,555,000,000 gals.
From Lake Wintergreen........	365,000,000 gals.
And from three Maltby lakes........	616,041,000 gals.
Total........	7,908,241,000 gals.
Average per day........	21,668,332 gals.

H 4. What are the maximum average and minimum amounts in gallons per twenty-four hours, which, with the existing facilities or appliances could be drawn from each of the present sources of supply; the answer to this question being based on all available records?

Chicago. Maximum capacity, less estimated slip, 458,220,000 gallons; rated capacity less estimated slip, 417,960,000 gallons; probable minimum, assuming 10 per cent. of pumps shut down, 376,164,000 gallons. (Details for each engine in plate 14, blueprint. Not reproduced here.)

Cleveland. Kirtland Street station, maximum, 91,080,000 gallons; average, 75,900,000 gallons; minimum, 51,900,000. This does not include 40,000,000 rated capacity at Division street station, held for emergency, the water from west side crib being condemned. In addition there was stored in distributing reservoirs an average of 108,400,000 gallons.

Syracuse. The amount of water which could be delivered by the existing conduit line from Skaneateles lake to Woodland reservoir would depend upon the difference in elevation between lake and reservoir. The maximum recorded elevation of lake is 864 9/10 feet above the Syracuse level of the Erie canal, which level is the water works datum. The lowest level of the reservoir, having in consideration its best usefulness, may be assumed at 511, water works datum. This would give a maximum working head of 353 9/10 feet for the submerged intake pipe and the conduit. The lowest recorded lake level is 857 9/10, water works datum and the flow line of reservoir is 631, water works datum, leaving a minimum working head of 226 9/10 feet. The average lake level in 1905 was about 861, water works datum, and the average level of water in reservoir was about 220, water works datum, so that the average working head was about 241 feet. While the discharge of conduit has never been accurately measured, it seems probable that under the respective working heads above given, its capacities would be respectively: maximum, 14,000,000 gallons per twenty-four hours; minimum, 13,550,000 gallons per twenty-four hours; average 13,650,000 gallons per twenty-four hours. The storge of about 120,000,000 gallons in Woodland reservoir would greatly increase the quantity which could for a few days be delivered through the distributing mains, the amount of this increase depending upon the size of the mains leading to the points at which the water was being drawn.

Indianapolis. Maximum, 38,000,000; average, 32,000,000; minimum, 28,000,000. These amounts would be for wells and filters combined. Wells: maximum, 16,000,000; average, 14,000,000; minimum, 13,000,000. Filters: maximum, 24,000,000; average, 18,000,000; minimum, 13,000,000. As it is improbable that the maximum and minimum capacities of wells and filters would occur at the same time, the total combined maximum has been reduced by two million gallons, and the total minimum has been increased by two million gallons.

New Haven. Amounts in millions of gallons per twenty-four hours that may be drawn from the several sources of supply are roughly as follows:

	Maximum.	*Average.*	*Minimum.*
Lake Whitney	16	12	10
Saltonstall	8	5	3
Dawson (including Chamberlain and Bethany)	7.5	7	6.5
Maltby (Nos. 1, 2 and 3)	5	1.7	1
Wintergreen	5	1	.5

The above amounts can only be very roughly estimated, as there is no way of measuring the supply from several of the sources. It should be borne in mind that the conditions are such that neither all of the maxima, nor all of the minima will occur at the same time, so that the maximum from all the sources will be less than the sum of all the individual maxima, while the minimum of all the sources will be greater than the sum of all the minima.

H 5. Are the present sources of supply or the facilities or appliances for developing the water therefrom insufficient for present needs or for the anticipated demands of the near future?

Chicago. The facilities or appliances for developing water from the present sources of supply are insufficient. Exhibit 6, which is an extract from the last report of Mr. W. A. Levering, Superintendent of the division of water pipe extension, gives much interesting and valuable information in regard to Chicago's distribution system. Further information can be found in Exhibits

1, 2 and 5, in Exhibits 20 to 23 inclusive, and in the section of this report entitled appraisal. (Exhibits 1, 2, 5 and 20 not reproduced here; for Exhibit 21, see answers to H 42, Note 6; for Exhibits 22 and 23, see H 44, Note 7.)

In general, it may be stated that while the thickness of the existing mains appears to be ample for much higher pressures than are found in Chicago, and the mains themselves to be well laid, the capacity of the system as a whole is far from adequate to the present demands. The per capita consumption in Chicago is already far in excess of what it should be, and it would be greater than it is if the pressures were high enough everywhere to enable all consumers to use the water. The pressures at the pumping stations are too low to begin with, and the friction in long lines of mains that are too small for the excessive consumption, further reduces the pressure to so low a point as to cause much hardship and deprivation to householders at a distance from the stations. There is little or no reserve pumping capacity at the stations, and even if higher pressures could be carried there, the result would be that the use and waste of water would be so increased as to call, first, for a still greater addition to the pumping capacity, and, next, for more tunnels.

The first steps towards improving these conditions would appear to be to check waste, leaks and other unauthorized consumption of water, by the introduction of meters on an intelligent and carefully considered plan, due regard being had to the effect of their introduction upon the net earnings of the plant, and by a thorough and systematic survey to determine where the waste is greatest, coupled with proper inspection of premises. When the consumption had in this way been reduced to a reasonable amount, the pressures at the pumping stations could easily be increased without danger to the mains, while the friction losses in the mains would be so reduced as to give persons remote from the stations what some of them have never yet enjoyed, a reasonably satisfactory service.

The use of meters has been persistently recommended for many years by successive city engineers, and by their subordinates in the bureau of water, but the appropriations necessary for their introduction have not hitherto been available. The council has at last, however, made an appropriation for meters, and it is the intention to set them as fast as possible on certain classes of services. In the meantime, the program for 1908 contemplates a number of large mains, with a view to increasing the pressures where they are now lowest. From the foregoing it will be seen that the inadequacy of the water mains is due largely to causes beyond the control of the division of water pipe extension. The personnel and discipline of the employees in the bureau of water generally, and especially in the division of water pipe extension are believed to have been greatly improved within the past few years. The maps, atlases, and other records are well kept up, considering the size of the system. The specifications for cast iron pipe are carefully prepared, and other branches of work speak equally well for the present efficiency of this division.

Exhibit 1, Report on the Water Supply System of Chicago, etc., by John Ericson, city engineer of Chicago, May, 1905, page 29 *et seq.*

Improvements contemplated and under way.

The new additions and improvements enumerated above had hardly been completed when, being guided by past experience, I turned my attention to still further extensions and alterations to the water works system. In 1897, in the city engineer's annual report, special attention was again called to the necessity and advisability of substituting modern machinery for the old, antiquated outfit at the Chicago avenue (North) pumping station. This recommendation was repeated every subsequent year until 1900. In 1899 the city council appropriated enough funds to permit the construction of new boiler plant. By this time, the old boilers at this station were in such condition as to be absolutely dangerous, and I am certain they could not have been kept in operation another year after the time that they were removed. In 1902, or about *nine* years after my first recommendation, funds were appropriated for three vertical triple expansion pumping engines of a daily capacity of twenty-five million gallons each to take the place of the old pumps installed in 1853, 1857, 1867 and 1872, respectively. The contract was let late in the same year. One of these engines has been installed and the second one will be in place before the end of this year.

As the per capita consumption of water kept increasing year by year, I commenced a careful investigation of the use, waste and leakage of the water pumped, and in 1901 submitted my conclusions in a report to the commissioner of public works.

Another anaylsis of the water supply situation in the southern part of the city, was the subject of a report to the commissioner in 1902. Extracts from both of these reports are made part of this report. To remedy this alarming situation, the installation of meters was recommended. This proposition was, however, generally received with suspicion, if not with animosity, and it was evident that if nothing was done at once to reduce the waste and leakage, and nothing further done in the way of adding to the pumping capacity, the usual conditions, an insufficient supply, would again soon prevail. Recommendations were, therefore, made to construct a new tunnel and pumping station in the southern part of the city. An additional pump of forty million gallons capacity was recommended for the Springfield avenue station, and one of equal capacity for the Central Park avenue station. I suggested that a twenty million gallon pump be installed at the Sixty-eighth street station, and one of three million gallons capacity at the Washington Heights station. Not until last and this year was money available for these improvements. Contracts have now been awarded, and, within another year, it is expected that all these pumping engines will be in operation. The lack of pressure in certain parts of the city, especially the Hyde Park district, made it advisable to also suggest the laying of additional large mains, and an appropriation for this purpose was granted in the beginning of this year. A considerable portion of these mains will be laid this summer. These mains are indicated by full blue lines on the accompanying map [not reproduced here]. New boiler plants will be installed at Harrison street, Lake View, Sixty-eighth street and Washington Heights pumping stations. Several other improvements of minor importance have also been authorized.

The following is a summary of the most important improvements which have been recommended and authorized, and of the approximate time of their completion, also estimated cost of same:

	Time of completion.	*Estimated cost.*
North (Chicago avenue) pumping station, 3 25-million gallon pumping engines. (1 already installed)	1906	$400,000
Springfield avenue pumping station, 1 40-million gallon pumping engine	1906	90,000
Central Park avenue pumping station, 1 40-million gallon pumping engine	1906	90,000
Sixty-eighth street pumping station, 1 20-million gallon pumping engine	1906	40,000
Washington Heights pumping station, 1 3-million gallon pumping engine	1906	20,000
South side (Roseland) system, 1 tunnel and pumping station. (Capacity of station, 50 million gallons, with room for 50 million gallons more)	1909	2,000,000
Large water mains, same as indicated by blue lines on map	1906	750,000
Total cost of improvements authorized and under way		$3,390,000

There are other improvements authorized estimated to cost about $950,000. These, however, will not add to the capacity of the system. These improvements include the extension of the Chicago avenue tunnels to the Carter Harrison crib, the reconstruction of the cross-town tunnels so [that] they will be entirely on city property, and new boiler plants.

The present maximum pumping capacity of all the stations is about 495,000,000 gallons per twenty-four hours. Allowing 25 per cent of this for reserve machinery, and for slip in the pumps, there should be a constant available supply of about 372,000,000 gallons per day. Assuming the present population at two million people, there would be a per capita daily supply of about one hundred and eighty-six gallons. As the per capita consumption for the year 1904 was at the rate of about two hundred gallons, it can readily be seen that the contemplated improvements have not been authorized any too soon.

When it is further considered that the monthly, weekly, and hourly variations may increase the consumption 150 per cent. or more, over and above the average yearly, irrespective of the large increase in pumpage required in case of a great fire, it is readily seen how necessary it is to provide for the additional supply without delay. The constantly growing per capita consumption under present unrestricted conditions is best illustrated by the accompanying diagram, Plate A. [Plate not reproduced.] According to this diagram, the per capita daily consumption in 1909 when the last of the immediately contemplated improvements is expected to have been completed will be about two hundred and seventeen gallons. The population at that time will have been increased to about two million four hundred thousand, according to the graphical representation * * * Plate B [not reproduced here], and which has been prepared from the most reliable data. The capacity of the present stations can be increased little or nothing after the additional pumps now under construction shall have been installed, since the limit of the tunnel capacity for each station will be about reached by that time, and it is hardly practicable to lower the pumps at any of the stations without seriously crippling and interfering with the water supply of the adjacent districts. When all the improvements now authorized and under way have been completed, the total pumping capacity of the city will be at the rate of about 687,000,000 gallons per day, or allowing as before 25 per cent. for slip and reserve machinery, a daily pumpage of say 515,000,000 gallons. At a per capita daily consumption of say 217 gallons (see Plate A), the system should then be sufficient for a population of about two million three hundred and seventy thousand; or, if the variations above referred to be considered, for considerably smaller population. An examination of the attached population diagram will show that the population will probably reach this number about 1909. The contemplated improvements and extensions will, therefore, barely have been completed when the city again will be face to face with the same old problem—the necessity for an additional water supply to meet the demands of the rapidly growing metropolis.

Cleveland. Sources of supply, abundant; facilities for developing it, sufficient for needs in 1905, and when additions now in progress are completed, will be adequate for several years to come. A fifteen-million gallon pump is being added at Kirtland street for low service (ready in 1906); a ten-million gallon pump is being installed at Fairmount (ready in 1906) for present high service to replace the old four-million gallon Cornish pump still remaining there. A second high service system is being built to comprise two two-million gallon pumps at Fairmount, pumping from Fairmount reservoir into mains leading to a two hundred thousand gallon water tower and tank, located about three and one-half miles east of Fairmount.

Syracuse. The source of supply is estimated to be sufficient for a city of five hundred thousand inhabitants. The capacity of the present conduit is now almost equaled by the consumption. A new conduit must be built in the near future as soon as laws can be passed, removing certain legal restrictions. A second distributing reservoir at a higher elevation than Woodland reservoir will also be constructed.

Indianapolis. No.

New Haven. Have been sufficient for needs up to date, but are constantly being increased.

H 6. Was distribution by (a) gravity from source of supply?

Chicago, Cleveland, Indianapolis. No.

Syracuse. Gravity from source of supply to distributing reservoir, and gravity from distributing reservoir to mains.

The city's water supply is drawn from Skaneateles lake and flows by gravity through a thirty-inch cast iron conduit 19.29 miles long from the lake into Woodland reservoir, whence it is delivered to the city by gravity through the distributing system of mains. The source of supply, and the water shed tributary to it, are such that beyond a nominal expense for patrolling the lake shore, and the outlay of a few thousand dollars for small intercepting sewers, the city has so far been at no cost to preserve the purity of the water supply, and as the supply is entirely by gravity, Syracuse has neither purification works nor pumping machinery.

New Haven. Yes.

(b) Pumping direct to mains.

Chicago, Cleveland, Indianapolis, New Haven. Yes.

Syracuse. No. Gravity system only.

Chicago. H 6 (b) and 6 (c). At the Chicago avenue pumping station there is a steel standpipe, three feet in diameter by one hundred thirty-eight feet high, enclosed in a stone masonry tower; and at the Twenty-second street station there is a steel standpipe five feet in diameter by about one hundred and eighty feet high. As these standpipes are too small to be of any value as reservoirs they have not been considered.

(c) Pumping to reservoir, standpipe or tank.

Chicago, Cleveland, New Haven. Yes.

Syracuse, Indianapolis. No.

H 7. If more than one method was used, give approximate amounts supplied by each.

Chicago. Direct to mains, 158,367,837,808 gallons; Washington Heights repumped, 272,060,802 gallons from mains to tank and to mains; Norwood Park pumped 31,045,000 gallons to tank and to mains.

Cleveland. All water was pumped direct to mains and reservoirs at same time, the surplus being stored in reservoirs.

Syracuse. Only one method (a) was used.

Indianapolis. ——

New Haven. See answer to H 3. Cannot separate (b) and (c).

H 8. Maximum capacity of impounding reservoirs.

Chicago, Cleveland. None.

Syracuse. 26,848,000,000 gallons; below elevation 466.4, and above elevation 456.

Indianapolis. 5,325,000 gallons.

New Haven. 2,278,000,000 gallons.

New Haven. (H 8 and 9.) Lake Whitney, Saltonstall, Bethany, Chamberlain and Maltby number 2 and Maltby number 3 impound, but do not distribute. Lakes Dawson, Maltby number 1 and Wintergreen impound and distribute. These last three lakes as well as the Prospect Hill reservoir and the East Haven reservoir are classed as distributing reservoirs. See Plate 2 (not reproduced here).

H 9. Maximum capacity of distributing reservoirs.

Chicago. 205,000 gallons.

Cleveland. Fairmount, low service, 80,500,000 gallons; Kinsman, high service, 34,400,000 gallons; total, 114,900,000 gallons. Fairmount low service reservoir is divided into two basins, having a combined capacity of 80,500,000 gallons. The flow line is about 154 feet above city datum, which datum is 2.34 feet above the government 0 for levels in Lake Erie. The reservoir is enclosed by earth embankment with outer slope of one on two, and inner slope of one on one and three-quarters. It is puddled with clay on inside, and paved with stone on slopes, and concrete on bottom and is in good condition, and well maintained.

Kinsman high service reservoir, with a single basin of a capacity of 34,400,000 gallons, is of similar general construction. Its flow line is 323 feet above city datum. Shortly after this reservoir was built its inner lining slipped on three sides, and the embankments now show a settlement in places of nearly two feet. There is a slight leak in the northeast corner, attempts to stop which have been only partially successful. The reservoir and the grounds around it are otherwise in good order and well maintained.

Syracuse. 121,000,000 gallons.

Indianapolis. None.

New Haven. 362,000,000 gallons.

PUMPING STATIONS.

H 10. Maximum capacity of pumps per twenty-four hours.

Chicago. Deducting estimated slip, 459,000,000 gallons. The above figures include capacity of pumps at Washington Heights.

Cleveland. Kirtland street, 91,080,000 gallons.

These are three in number. At the Division street station there are three engine houses numbered respectively, according to date of erection, one, two and three, and four boiler houses numbered in the same way, one, two, three and four. The pumps and boilers originally placed in engine house number one, and boiler house number two, have all been removed or dismantled. In engine house number two there still remains a ten-million Holly vertical triple expansion engine, which takes its water at about seventy-five pounds pressure from a 42-inch main leading from the Kirtland street station, and repumps this water into the high service mains, and Kinsman reservoir. In engine house number three, there are two twenty-million gallon vertical triple expansion engines, one an Allis and the other a Holly engine, which are held in reserve for pumping to low service. These pumps could be started on about six hours' notice. In boiler house number two at Division street, there are four return tubular boilers, and two Stirling water tube boilers, all with American underfeed stokers. In boiler house number three, there are four return tubular boilers with Murphy stokers, and in boiler house number four, there are six Geary water tube boilers, with Brightman stokers. There are no superheaters and except for the stokers, there are no automatic coal handling appliances. All the buildings are of substantial masonry construction. Engine house number one and boiler house number one are practically dismantled. The others are kept in fairly good order and repair. The machinery still in service or held in reserve is well cared for.

The Kirtland street station, finished in 1904, is shown in various stages of construction in Plates XXV to XXIX inclusive (photographs not reproduced here). This handsome station at present houses two twenty-five million gallon vertical triple expansion Holly engines, and two fifteen-million gallon horizontal Compound Condensing Duplex Knowles engines. Steam is supplied by six Babcock and Wilcox water tube boilers equipped with superheaters, automatic chain grate stokers. A steel coal bin in the boiler room receives its coal from cars which come in on rails laid on top of the bin, and from cars to bins, from bins to automatic weighing machines, and from the weighing machines to the hoppers of the stoker. All the feed is by gravity. Ashes are dumped into tram cars running on tracks in the basement, and then dumped into a bin, whence they are removed to make ground along the lake front to the pumping station breakwater. The two Knowles engines were built in 1880, and were moved from Division street station in 1903 and 1904. They will ultimately be replaced by larger engines of the vertical triple expansion type. Worthington engine number four, located in a temporary engine house in rear of the boiler house, was built in 1893, and was removed from Division street in 1905, but was not ready to run during that year. While these last three pumps cannot now be classed as modern, they are kept in first rate order. Every other part of the mechanical equipment of the Kirtland station is modern and up to date, and the station buildings reflect great credit upon the engineers of the water works division who are responsible for their design and construction. Plates XXX and XXXI (photographs; not reproduced here) are interior views of the engine room and show one of the Holly engines.

The Fairmount pumping station erected in 1884 is located adjacent to the two basins of the eighty-million gallon Fairmount low service reservoir. In 1905 its equipment consisted of two four-million gallon Cornish pumping engines built in 1855, and six old Cornish boilers, all of which had been removed from Division street station. During 1905 these pumps and boilers were being removed and scrapped. It is the intention to install a ten-million gallon low duty Worthington engine to pump from Fairmount reservoir into the first high service system, and two two-million gallon vertical triple expansion engines to pump from Fairmount reservoir into the second high service system. The front of the station will also be remodeled to some extent, the old standpipe, with the masonry tower enclosing it, will be torn down, and five boilers removed from Division street will replace the six old Cornish boilers. In general, it may be said, that while some of the pumping stations are old, and some of the machinery is antiquated, a few pumps being obsolete, the entire mechanical equipment gives evidence of careful and efficient operation. Cleveland enjoys very favorable conditions for economical pumping, including abundant supply to the suction pipes, low and almost constant suction lift; practically constant pressure on the discharge side of the pumps; and reservoirs for each service, which enable all the pumps to be operated at their most economical speed. The station duties obtained, as shown on exhibits three (not reproduced here) and twenty (see H 165) should, nevertheless, be classed as creditable, when the age and type of some of the pumps are considered.

Syracuse. No pumps.

Indianapolis. 82,000,000 gallons.

New Haven. If all could be run at once, forty million gallons. Under existing conditions, probable combined maximum capacity of pumps would be about 33,000,000 gallons.

H 11. Daily supply stored in impounding reservoirs.

Chicago, Cleveland. None.

New Haven. No accurate figures available.

Syracuse.

(*a*) *Maximum at elevation* 463.1	(*b*) *Minimum at elevation* 458.8	(*c*) *Average at elevation* 461
18,054,031,800 gal.	6,951,672,000 gal.	12,569,124,000 gal.
Indianapolis.		
5,325,000 gal.	3,000,000 gal.	4,500,000 gal.

H 12. Daily supply stored in distributing reservoirs.

Chicago.	(*a*) *Maximum.*	(*b*) *Minimum.*	(*c*) *Average.*
	205,000 gal.	Probably 50,000 gal.	Est. 125,000 gal.

Cleveland.

(a) *Maximum.*	(b) *Minimum.*	(c) *Average.*
Fairmount L. S.	*Fairmount L. S.*	*Fairmount L. S.*
90,500,000	57,247,000	79,200,000
Kinsman H. S.	*Kinsman H. S.*	*Kinsman H. S.*
24,400,000	19,398,000	29,400,000
Total gal. 114,900,000	gal. 76,645,000	gal. 108,600,000

	(a) *Maximum.*	(b) *Minimum.*	(c) *Average.*
Syracuse.	121,000,000 gal.	90,430,000 gal.	116,400,000 gal.
Indianapolis.	None.	None.	None.

New Haven. Definite figures not available, but it seems probable that most of the reservoirs were maintained somewhere near full.

H 13. Total gallons of water pumped during year.

Chicago. 135,821,032,339 gallons, including Washington Heights.

Cleveland. Deducting slip, engines at Kirtland street pump 21,040,200,000 gallons. All water pumped to city was pumped by engines at Kirtland street station into low service mains or Fairmount low service reservoir. This total amount was 21,040,200,000 gallons, of which amount the ten million gallon Holly engine at Division street station, which took its water under pressure from low service mains, repumped 2,006,600,000 gallons into high service mains or Kinsman reservoir. The two old Cornish pumping engines at Fairmount station, taking their water from Fairmount reservoir, also repumped 312,536,000 gallons into the high service mains or Kinsman reservoir.

Syracuse. No water pumped.

Indianapolis. 6,124,321,866, allowing for estimated slip.

New Haven. 4,122,000,000, allowing for slip.

H 14. Average gallons pumped per twenty-four hours.

Chicago. 372,112,417, including Washington Heights.

Cleveland. Deducting slip, pumped at Kirtland street, 57,644,384. Repumped at Division street, 5,497,534; repumped at Fairmount, 856,263.

Syracuse. No water pumped.

Indianapolis. 16,778,964, allowing for estimated slip.

New Haven. 11,290,000, allowing for slip.

H 15. Average static head against which pumps work.

Chicago. See H 16.

Cleveland. 169.8 feet. Based on average head of water in intake tunnel and in reservoirs, the average static head against which the engines at Kirtland street worked was 171.51 feet; for the engines at Division street and Fairmount, the average static head was 151.9. The average static head for all the pumps, based on plunger displacement without allowance for slip, was 169.8 feet.

Syracuse. No pumps.

Indianapolis. No reservoirs. See H 16.

New Haven. About 101 feet.

H 16. Average dynamic head against which pumps were worked.

Chicago. 104.07 feet. The dynamic head against which water is pumped at each station as shown in plate XV (not reproduced), is calculated from the pumping station reports for 1905, but it should be stated here that the manner in which the pressure gauges are connected to the mains throws doubt upon the accuracy of some of these reports. Many of these gauges are set at considerable elevations above the points at which their gauge pipes are tapped into the discharge mains, and in each case the reported dynamic head was based on the assumption that the gauge pipe was entirely filled with water, and contained no air. The approximate height of gauge above the point at which its pipe is tapped into the main and the average dynamic head calculated from the reports for each station are as follows for the eight principal pumping stations.

Pumping station.	*Approximate height of gauge above tap in main.* (*Feet.*)	*Average dynamic head for* 1905, *calculated from reports.* (*Feet.*)
Chicago avenue, main engine room	15	100.79
Holly engine room	3	105.89
Twenty-second street	24	97.48
Harrison street	33	99.35
Fourteenth street	32	108.92
Sixty-eighth street	8	116.25
Lake View	8	99.79
Central Park avenue	31.5	97.92
Springfield avenue	35	100

It is obvious that if part of any gauge pipe contains air, instead of water, the reported gauge readings will indicate a dynamic head which will exceed the actual head against which the pump is working by just the height of the air column in the gauge pipe. As air is lighter than water, the tendency is for it to enter the gauge pipe at every opportunity, and to rise to the top of this pipe, displacing a corresponding volume of water. Water kept in more or less violent motion, as by the plungers of pumps, usually contains at least a little air, some of which will enter the gauge pipe, and when the tap for a gauge pipe is made near the top of a discharge main, or in the air chamber, near the line between the air and the water, the pipe is likely to become full of air much more rapidly.

When the height of the gauge above the tap in the main is, as in the case of the Harrison Street and some other stations in

Chicago, one-third of the total dynamic head, the reported dynamic head might, under the most unfavorable conditions be 50 per cent in excess of the actual. It is not believed that any of the reported dynamic heads are in error to anything like this extent, but some air was found by actual test in a number of gauge columns, and when this air was blown out, the gauges dropped several pounds.

There is no means of estimating, even approximately, what was the average error from this cause in 1905, but the manner in which the gauge pipes are tapped into the mains, the rough tests made and other attendant circumstances indicate that the errors were probably greater at the Harrison Street and Fourteenth Street stations than at the others. This condition may offer a partial explanation of the fact that the reported duty of the old pumps at Harrison Street station exceeds that of the newer engines with superheaters at Springfield Avenue and Central Park Avenue. (See H 85 and H 165.)

Any errors in gauge readings will, of course, affect directly the station duty, Plate 15 (not reproduced), as well as the cost of pumping a million gallons of water against the dynamic head of one hundred feet, Plate 16 (not reproduced). Some of the machinery is so antiquated that it would pay to replace it as soon as possible, and there is almost no reserve in pumping capacity at any of the large stations, so that all the pumps have to be kept going an unusually large percentage of the time. But the fact that the pumps are actually able to run so long without shut-down, and the actual station duties obtained in their operation, speak well on the whole for the pumping station crews.

Cleveland. 197.6 feet.

A tabulated summary of work done by the pumping engines in 1905 is given on page 178.

The average dynamic head of 197.6 feet given in answer to H 16 (above) is the average dynamic head against which all the pumps worked, based on plunger displacement measurement.

Syracuse. No pumps.

Indianapolis. 194 feet.

New Haven. About 119 feet.

H 17. Average number of foot-gallons of work done by pumps per 24 hours, based on dynamic head.

Chicago. 28,725,730,237.

Cleveland. 12,256,500,000 foot-gallons for all pumps after deducting slip.

Syracuse. No pumps.

Indianapolis. 3,255,119,010, allowing for estimated slip and not including work done by air lift compressors, nor by pumps at filter plant.

New Haven. 1,129,728,767.

KIRTLAND STREET PUMPING STATION.

Pumping Engine.	*Water Pumped Figured from Plunger Displacement.*	*Estimated per cent. of Slip.*	*Net Water Pumped, Deducting Estimated Slip.*	*Average Dynamic Head.*	*Million Ft. Gals. Based on Plunger Displacement.*	*Million Ft. Gals. After Deducting Estimated Slip.*
Knowles No. 1............	2,557,734,200	7	2,378,692,806	180.8	462,432	430,068
Knowles No. 2............	1,811,863,920	7	1,685,033,046	182.1	329,947	306,845
Holly No. 2...............	8,944,485,693	4	8,586,706,265	181.8	1,626,110	1,561,062
Holly No. 3...............	8,739,338,179	4	8,389,764,652	223.6	1,954,107	1,875,950
	22,053,421,992		21,040,197,169		4,372,596	4,173,925

DIVISION STREET AND FAIRMOUNT STATIONS, REPUMPING TO HIGH SERVICE.

Pumping Engine.	*Water Pumped Figured from Plunger Displacement.*	*Estimated per cent. of Slip.*	*Net Water Pumped, Deducting Estimated Slip.*	*Average Dynamic Head.*	*Million Ft. Gals. Based on Plunger Displacement.*	*Million Ft. Gals. After Deducting Estimated Slip.*
Division St., Holly No. 1...	2,090,206,208	4	2,006,598,459	197.8	413,442	396,905
Fairmount, Cornish No. 1..	204,996,057	15	174,246,648	159.3	32,156	27,757
Fairmount, Cornish No. 2..	162,693,714	15	138,289,657	159.3	26,418	22,030
	2,457,895,979		2,319,134,764		472,016	445,692

H 18. Difference between gallons of water stored in impounding reservoirs at end and at beginning of year, expressed as increase or decrease.

Chicago, Cleveland. None.

Syracuse. 2,759,400,000 gallons increase.

Indianapolis. Practically none.

New Haven. Definite figures not available.

H 19. Difference between gallons of water stored in distributing reservoirs at end and at beginning of year, expressed as increase or decrease.

Chicago. Practically none.

Cleveland. Decrease in Fairmount reservoir of 2,244,000 gallons, minus increase in Kinsman reservoir of 732,000 gallons, makes net decrease of 1,512,000 gallons.

Syracuse. So small as to be negligible.

Indianapolis. None.

New Haven. Definite figures not available.

H 20. Total gallons consumed during year.

Chicago. 135,588,942,538.

Cleveland. 21,040,200,000, plus 1,512,000, equals 21,041,712,000 gallons.

Syracuse. 4,507,750,000 gallons (about).

Indianapolis. 6,124,321,866.

New Haven. 7,908,941,000.

H 21. Average gallons consumed per 24 hours.

Chicago. 371,476,555.

Cleveland. 57,648,526.

Syracuse. About 12,350,000.

Indianapolis. 16,778,964.

New Haven. 21,668,332.

DISTRIBUTION SYSTEMS

H 22. Kind of pipe in use for mains.

Chicago. Cast iron bell and spigot pipe. Later pipe required to be tested at factory to 300 pounds per square inch. Some of the older pipe is somewhat lighter.

Cleveland. Cast iron bell and spigot pipe, except for some short lengths of steel riveted pipe on discharge mains or in pipe tunnels. C. I. pipe usually tested to 300 pounds per square inch for 20-inch pipe and under. Over 20-inch, the test is 250 pounds per square inch. Some of the older pipe is somewhat lighter.

The distributing system is fairly well gridironed and the main arteries are adequate in size for the service demanded of them. There are, however, a good many small mains, and too large proportion of hydrants with small barrels and small connections, principally four-inch, to the mains. The pipes are abundantly strong for the pressures they are called upon to withstand, and appear to have been well laid. All mains of 10 inches or more in diameter are shown on Plate II (not reproduced); the 8-inch, 6-inch, 4-inch and 3-inch mains not being shown thereon. The system is fairly well equipped with gate-valves, and appears to be well cared for and maintained.

Syracuse. Cast iron hub and spigot pipe. All pipe laid since 1892 tested to 300 pounds per square inch up to and including 20-inch pipe. Larger sizes tested to from 225 to 300 pounds, according to location. Some of the old mains laid prior to 1892 were slightly lighter, but all of the old water company's mains except about 20 miles of the newest of them have been removed and replaced. There are a few galvanized iron pipes laid by the city for temporary supply to consumers off the line of mains, but these are not considered here.

At the close of the year 1905 the distributing system consisted of 179.306 miles of cast iron mains from 4 inches to 36 inches in diameter. When the new works were constructed, the existing mains were comparatively few and short and of small diameter. As a rule a distributing system of mains grows piecemeal with the city, and it is, therefore, usually impossible or impracticable to forecast far in advance just where mains should be laid and what their size should be, or even if this forecast could be made, it would often be impossible for economical reasons to lay the large arteries which should form part of the ideal system in advance of the need for them. In Syracuse an unusual opportunity was offered to design and construct a large distributing system practically as a whole for a city of 100,000 people. The engineer in charge made good use of this opportunity, and the result is a well planned and constructed system of mains of unusually large average diameter, well gridironed, and equipped with more than the average number of gate-valves.

An interesting description of the reconstruction of the Syracuse water works plant will be found in the paper by Mr. W. R. Hill, Exhibit II (not reproduced). An examination of the plans and an inspection of the plant itself show that all of this work was designed and executed with skill and care on the part of the engineers who were responsible for it. The maps, plans and engineering records left by them are very full and complete, and will prove of great value in the construction of the new conduit line and reservoir. The later maps and records of the bureau of water are by no means so complete nor so well kept up to date. (See H 114.)

Indianapolis. Cast iron bell and spigot pipe of standard weight, tested to 300 pounds per square inch, has been exclusively used for many years. A little of the older pipe is somewhat lighter.

New Haven. Standard weight cast iron pipe on low levels and on all new work. There are still a few miles of old cement-lined wrought iron pipe, principally on upper levels near lakes, but this is being replaced with cast iron as fast as possible.

Besides lakes Dawson, Wintergreen and Maltby No. 1, which have been already described, and which impound as well as distribute, there are two other smaller distributing reservoirs. Prospect Hill reservoir, which has twin basins of a combined capacity of 5,800,000 gallons, and an elevation of 124.6 feet at flow-line, is shown on Plate XV (not reproduced). This reservoir is supplied by pumps at the Whitneyville station with water from Lake Whitney—now filtered. The reservoir is enclosed by masonry walls backed by earthen embankments, and its bottom is lined with concrete.

East Haven reservoir, supplied by pumps at Lake Saltonstall, has an elevation of 142.3 feet above sea level, and an available capacity of 4,200,000 gallons. It has a concrete bottom with concrete walls backed by earth embankments. There is a slight leak in this reservoir above the 143-foot level. Otherwise, both reservoirs are in good shape. Both are very neatly kept and well cared for.

All of the New Haven mains are interconnected into one general system except those which distribute the water from Lake Wintergreen. As none of the other lakes are high enough to serve Prospect Hill, the water from Lake Wintergreen is reserved for this district and its mains are kept separate from the rest. The pipe system in New Haven is unique, in that, instead of branching out from one or perhaps two centers of distribution, as is usually the case, the large mains come in towards the center from almost all points of the compass except the south and southwest.

The plan of the mains leading in from the five widely separated sources of supply and cross-connected on almost every street resembles a gigantic spider web more than it does the usual "gridiron" plan. Plate III (not reproduced) shows not only the mains but also in dotted lines the streets on which there are no mains, and it will at once be noted that there are very few of the latter, as there is a main on almost every street in the city and adjacent towns. There is very little 4-inch main—only about five miles—and most of this is found in West Haven, the territory originally supplied by the West Haven Water company, whose plant and franchise were purchased by the present company in 1902. The average size of the mains is unusually good, considering the size of the city and the fact that the supply is brought in towards the center from five different directions. There are a few miles of old cement-lined pipe, some of it of fairly large diameter, principally on the upper levels where the pressure is lighter, but these are rapidly being replaced by cast iron mains.

Owing to the fact that with the exception of Lake Wintergreen the distributing reservoirs which furnish the gravity supply to the city are only from 125 to 136 feet above sea level, the pressures maintained in the city, after deducting the friction losses, are not as a rule sufficient to give effective hydrant streams for buildings of any great height. Fire steamers are usually, therefore, employed when such streams are needed. In this connection Mr. Rufus H. Fancher, chief of fire department, states that on only one occasion has there been any shortage of water for steamer use during the eight years that he has been chief. This was on March 5, 1904, at the Fisher fire on Prospect Hill. He says that he was able, however, to get three 1⅛-inch streams from a six-inch main, two of the streams being good, and one bad. At that time this six-inch main was a dead end, but this main has now been replaced by a ten-inch and the circuit completed. The chief considers the supply and pressure adequate when steamers are used. He further states that the mains are laid on almost every street, are well gridironed, and have very few dead ends; that the multiplication of sources of supply insures plenty of water, and that in the dryest of seasons there is "never any let up. Every body uses all he wants to and never knows what it is to be short." Also, that the mains have never broken at time of fire, and that the fire department has never been handicapped by any breaking of mains.

In explanation of the partial shortage of water referred to by the chief as having occurred at the Fisher fire on March 5, 1904, Mr. David Daggett, Secretary, New Haven Water company, states that the ground was covered with snow and ice, and the steamers tried one hill after another before they were able to get up to the neighborhood of the fire, finally arriving, with tired horses, by a roundabout way. They then drew from two hydrants on a six-inch main, leaving an eight-inch main close to the fire untouched.

The entire distributing system appears to be well cared for.

H 23. Total length of mains in miles at end of year.

Chicago. 2,020.49, including 46½ miles of hydrant branches. The largest single item of value in the Chicago plant is represented by its water mains. In order to be sure of reasonable accuracy in this important item, the length and size of each main on each street were measured for the city atlases. It was found that the total length of mains of all sizes checked within about 1 per cent. with the total lengths given in the annual reports. There were, however, much larger discrepancies between maps and reports as to the lengths of certain sizes of mains. For the purposes of the appraisal it was assumed that the mains were as shown on the maps.

Cleveland. 647.48 miles (not counting 2.64 miles of three-inch pipe).

Syracuse. 179.306 miles.

Indianapolis. 270.95 miles.

New Haven. 184.5 miles.

II 24. Length, in miles, of mains of each diameter.

Inches.	Chicago.	Cleveland.	Syracuse.	Indianapolis.	New Haven.
		(In miles.)			
4	163.39	28.11	7.339	17.26	5.0
6	1,117.65	362.11	42.894	135.16	73.0
8	415.04	95.51	38.812	54.61	31.0
10	5.83	44.72	20.808	14.12	15.0
12	119.34	25.50	18.900	26.14	16.0
14	5.20	.....	.....	.....	.....
16	69.20	22.11	13.045	11.55	11.0
18	0.27	.....	.....	.....	.....
20	1.03	5.57	9.726	5.36	2.5
24	69.70	8.03	3.976	3.42	6.0
27	.....	.....	.....	.....	3.5
28	0.05	.....	.....	.....	.....
30	7.74	22.28	1.517	1.52	.....
33	.....	0.23	.....	.....	.....
36	44.75	12.90	2.254	1.91	.....
40	.....	0.12	.....	.....	.....
42	.....	4.48	.....	.....	.....
48	0.50	5.51	.....	.....	.....

Cleveland

TOTAL MILEAGE OF MAINS AND PIPE IN ALL DISTRICTS.

	Low Service District		1st High Service District		2d High Service District	All Districts	
Diameter in Inches	Cast Iron Mains	Steel Riveted Pipe	Cast Iron Mains	Steel Riveted Pipe	Cast Iron Mains	Cast Iron Mains	Steel Riveted Pipe
48	4.89	0.62	.....	...	.....	4.89	0.62
42	4.48	...	.....	...	.....	4.48	...
40	...	0.12	.....	...	.....	...	0.12
36	12.84	0.06	.....	...	.....	12.84	0.06
33	...	0.05	.....	0.18	.....	...	0.23
30	14.35	0.12	7.81	...	.....	22.16	0.12
24	3.42	...	4.61	...	...	8.03	...
16	19.25	...	2.20	...	0.66	22.11	...
20	3.69	...	1.88	...	...	5.57	...
12	15.72	...	9.78	...	.....	25.50	...
10	30.52	...	14.20	...	.....	44.72	...
8	81.84	...	13.67	...	.....	95.51	...
6	298.77	...	63.16	...	0.18	362.11	...
4	23.38	...	4.72	...	0.01	28.11	...
Totals						636.03	1.15

H 25. Average diameter of mains, determined by multiplying the mileage of each diameter by that diameter, adding the product, and dividing their sum by the total sileage of all the mains.

Chicago.	*Cleveland.*	*Syracuse.*	*Indianapolis.*	*New Haven.*
8.38	9.42	10.15	8.34	9.15

H 26. Total number of gate-valves in use at end of year.

	Total.	(*a*) *Average number of gate-valves per mile of main.*	
Chicago.	16,500	8.15	
Cleveland.	14,256, of which 7,624 are on hydrant branches, leaving 6,614 on mains.	10.5	(after deducting hydrant branches.)
Syracuse.	2,639	14.718	
Indianapolis.	1,902	7.02	
New Haven.	5,000	27.1	

(b) Number of each size of gate-valves.

Inches.	*Chicago.* (1)	*Cleveland.* (2)	*Syracuse.*	*Indianapolis.*	*New Haven.*
4	1,240	297	156	407	....
6	9,740	4,040	1,202	1,000	....
8	3,892	973	704	256	....
10	50	439	211	66	....
12	928	345	153	90	....
14	30	...	...	...	....
16	290	184	104	42	....
20	4	45	73	18	....
24	200	40	17	15	....
28	1	...	...	...	....
30	26	118	10	2	....
36	99	67	9	6	....
42	....	33	...	...	....
48	....	33	...	...	....

(1) (Chicago.) The count of valves from the maps showed a total of 15,313; the city reports showed 16,814. For this appraisal the total was placed at 16,500.

(2) (Cleveland.) Not counting valves on hydrant branches.

H 27 and 28. Kind and average length of service pipe used.

	(*Feet.*)
Chicago. Extra strong lead..................	18
Cleveland. From main to curb, extra strong lead up to one-inch inclusive; from 1-inch to 2-inch, galvanized iron; over 2-inch, cast iron bell and spigot.......	19

Syracuse. Up to 1½-inch diameter, lead pipe AAA Brooklyn gauge. This about equals in weight the ex-the extra strong of the trade, which is the heaviest pipe usually listed. From 1¼ to 2½-inch, galvanized iron; above 2½-inch, cast iron. .... 20 (about)

Indianapolis. Extra strong lead................ 17

New Haven. Wrought iron and extra strong lead 20 City ordinances allow nothing less than 1¼-inch for wrought iron, nor less than ¾-inch for lead.

APPRAISAL OF PLANTS

(ENGINEER'S PRINTED REPORT SCHEDULE, PAGE 3.)

INQUIRIES "H" 30-47.

The purpose of these inquiries is to ascertain the present structural value of the plant, exclusive of the franchise, prospective profits, monopoly right, good will, etc. Consideration should be taken of the condition of the plant, the cost of duplication, the state of the industry and the value of the plant in view of the latest processes and new inventions. Allowance should be made for the legitimate expenses of organization of company or department, securing of legislation, cost of surveys, engineering advice, preparation of plans—in fact, all items that would at the present need to be expended to construct and put into operation a plant duplicating the one now existing. Property which is not used at present in the collection or distribution of water should not be included. Estimated cost of opening and replacing paving which was laid *after* mains and services were laid should be stated separately.

Notes on Appraisal.

(1) (H 30, Chicago.) The values of the lands at pumping stations, storage yards and repair shops were taken from the inventories for January 1, 1906, in the offices of the respective departments having to do with these parts of the plant.

The values of "sundry lands not included in above" were taken from the comptroller's report for 1904. These latter values have been stated at the same figures in successive comptrollers' reports for many years past with no changes for appreciation or depreciation. They are, therefore, probably not very accurate.

(2) (H 33, Chicago.) In the appraisal of the cribs the figures given for equipment and supplies in the inventory of January 1, 1906 were assumed as correct. The values of the cribs themselves were arrived at with the assistance of Mr. J. H. Spengler, assistant city engineer. It should be noted here that the cost of the four-mile crib was $469,574.83, while the Carter H. Harrison crib, considered a finer structure, cost only $225,000 (see also H 137). The cost of the former crib was regarded as excessive and the appraisal was based on a comparison of the values of the two cribs with the Carter H. Harrison crib as a standard. On account of the heavy expense of keeping the old two-mile crib free from ice, and for other reasons, that crib will be abandoned as soon as a tunnel can be completed between it and the Carter H. Harrison crib.

Exhibit 10 (p. 188) is a table showing the estimated present values of the cribs. (These notes are continued on p. 188.)

			Chicago.		Cleveland.[9]		Syracuse.[10]
H 29.	As of date (end of fiscal year)		Dec. 31, 1905		Dec. 31, 1905		Dec. 31, 1905
30.	Land		$3,307,618 00[1]		$279,700 00		$1,022,178 66
	(a) Watershed, sources of supply, right of way for conduits	......		......		......	
	(a1) Above, including legal and court expenses, damages, etc. (Syracuse)	......		......		$863,038 66	
	(b) For reservoirs, standpipes, tanks, etc.	Included in land for pumping works.		$120,000 00		134,140 00	
	(c) For filtration works	......		......		......	
	(d) For pumping works	$1,262,182 00		148,600 00		......	
	(e) For offices, storage yards, shops	116,436 00		11,158 00		......	
	(e1) For offices, storage yards, shops, barns, etc. (Syracuse)	......		......		25,000 00	
	(f) Sundry lands not included in above (Chicago)	1,929,000 00		......		......	
30a.	Salaries, fees and miscellaneous expenses in general construction (Syracuse)		......		......		68,625 00
31.	Constructions for storage at source of supply		......		......		100,520 73
32.	Wells—artesian, driven or open		6,000 00		......		......
33.	Cribs		615,492 04[2]		124,102 21		......
34.	Conduits, aqueducts and tunnels to mains		5,839,108 38[3]		......		869,807 38
34a.	Conduits, steel-riveted pipes, aqueducts and tunnels to mains (Cleveland)		......		1,565,861 27		......
35.	Buildings		710,104 73[4]		714,533 21		19,000 00
	(a) Pumping stations	$678,458 33		$712,369 11		......	
	(b) Office buildings	......		......		......	
	(b1) Office buildings, barns (Syracuse)	......		......		$19,000 00	
	(c) Repair shops, storage yards	31,646 40		2,164 10		......	

			Chicago		Cleveland	Syracuse
36.	Pumping equipment		1,421,825 76		853,453 77	......
	(a) Boilers	$245,320 00		$117,431 58	......	
	(b) Pumps and engines	1,080,790 00		736,022 19	......	
	(c) Pipes, valves, etc. in ground	......		Included in II 50b	......	
	(d) Other pumping equipment	95,712 76		......	......	
37.	Distributing reservoirs		...		420,000 00	351,515 04
38.	Standpipes and tanks		11,000 00		One at Fairmount, value included in that of buildings, II 35a.	......
39.	Sand filtration beds (excluding land)		......		......	......
40.	Mechanical filters (excluding land)		......		......	......
41.	Other filtration works (excluding land)		......		......	......
42.	Mains (Syracuse)		......		......	1,201,597 11
42a.	Mains (including valves and basins)		16,751,222 27		......	......
42b.	Mains (including valves) (Cleveland)		......		7,815,628 01	......
43.	Meters.—Only meters owned by city (of Chicago) are 1327 and 5-inch meters valued at $5 each, acquired in annexation of Austin		6,635 00		......	1,798 00
43a.	Meters in service (Cleveland)		......		680,191 12	......
44.	Hydrants		751,672 00		181,032 75	69,403 67
44a.	Fire cisterns		30,000 00		......	......
45.	Services		City owns none.		None owned by city.	318,801 20
45a.	Supplies on hand as per inventories of all departments (Cleveland)		......		254,381 79	......
46.	Furniture and fixtures, maps, atlases and engineering records and other equipment and supplies not included in above; teams, tools and other accessories		101,067 08		......	77,002 56
46a.	Other accessories not included in II 45a (Cleveland)		......		35,307 00	......
47.	Total		$29,874,762 21		$10,930,290 74	$4,408,713 41

EXHIBIT 16. ESTIMATED VALUES OF CRIBS.

Crib.	*Structure*		*Equipment*		*Supplies*	
	Original Value.	*Present Value.*	*Original Value.*	*Present Value.*	*Original Value.*	*Present Value.*
Lake View	$137,538.94	$112,446.90	$684.70	$504.15	$155.44	$155.44
Two mile	102,984.43	5,149.22	3,695.20	2,039.25	......	......
Carter H. Harrison	225,000.00	200,000.00	3,316.10	2,675.40	220.70	220.70
Four mile	469,574.83	200,000.00	3,519.85 /	2,825.40	375.28	375.28
Sixty-eighth street	134,104.92	97,895.92	7,738.10	5,760.43	97.29	97.29
Total present value, structures						$615,492.04
Total present value, equipment						13,804.63
Total present value, supplies						848.71
						$630,145.38

(3) (H 34, Chicago.) See also H 122. The values of the land and lake tunnels were determined with the assistance of Mr. Spengler. The cost of the land tunnels leading from foot of Oak street to the Springfield avenue and Central Park avenue stations was considered excessive, as this cost included about $600,000 claimed for extras by the contractor. This claim was allowed by the lower court, but, upon appeal, the case was sent back for a retrial and is now about to come up again.

A comparison of the cost of these tunnels with that of other similar ones indicated that the former could now be built new for about $1,500,000 instead of $2,121,525, so the lower figure was taken as the fair cost of reproduction.

In estimating the depreciation on this and on certain other land tunnels, the following facts called for special consideration. These tunnels were built by the city, not under its own streets, but along the shortest route to the desired objective, and much of the construction was thus done under private property without the consent of the owners. The city has already had to pay in one instance about $100,000 to a property owner who in sinking piles to erect a large building pierced the tunnel. The escaping water caused damages assessed in the above sum. In another instance, when a property owner was about to sink foundations for a building, it became necessary for the city to go to large expense in order that its tunnel might be preserved and at the same time the building protected against injury. These facts call for the abandonment of parts of these tunnels and the construction of other tunnels to replace them, but this time under the city streets. The depreciation of those tunnels which it is thought will thus have to be replaced was, therefore, in each case based on the age of the tunnel and its estimated remaining life in service.

EXHIBIT 17.—ESTIMATED VALUES OF LAND AND LAKE TUNNELS.

Description.	*Original value.*	*Present value.*
1 5-ft. tunnel from Two Mile crib to Chicago ave. pumping station. ...	$361,881.62	$361,881.62
1 7-ft. tunnel from Two Mile crib to Chicago ave. pumping station....	415,709.36	415,709.36
1 7-ft. tunnel from Chicago ave. station to 22d st. pumping station...	542,912.81	46,800.57
1 7-ft. tunnel from Two Mile crib to Chicago ave. pumping station....	542,768.54	300,000.00
1 Tunnel from shaft at Park Row and I. C. Railroad to Four Mile crib with connection to 14th st. station.	1,104,744.12	1,104,744.12
1 7-ft. tunnel, Park Row shaft to Harrison st. station...	384,380.04	18,568.67
1 6-ft. tunnel on Jefferson st., from Van Buren to Harrison st........	15,968.17	1,064.54
1 10-ft. tunnel from foot of Oak st. to Carter H. Harrison crib..........	677,577.55	677,577.55
1 10-ft. tunnel from foot of Oak st. to shaft at Green st. and Grand ave.; 2 8-ft. tunnels from this intersection, 1 to Central Park ave. station, and 1 to Springfield ave. station	2,121,525.02	1,141,143.77
1 7-ft. tunnel connecting above 10-ft. tunnel with the Chicago ave. pumping station	42,436.45	42,436.45
Remodeling tunnel system at Chicago ave. station	31,380.00	31,380.00
1 7-ft. tunnel from Lake View crib to Lake View station................	701,792.45	701,792.45
1 7-ft. tunnel from 68th st. crib to 68th st. station	771,556.07	771,556.07
1 10-ft. shaft and 150 ft. of 7-ft. tunnel to supply new pump at 68th st. station	7,000.00	7,000.00
	$7,421,629.12	$5,621,935.17
Water pipe tunnels..................	217,173.31	217,173.31
		$5,839,108.48

(4) (H 35, Chicago.) The values of the various buildings agree with those given in the inventories for January 1, 1908.

(5) (H 36, Chicago.) The present value of pumping engines and boilers as given in the inventory for January 1, 1908, was obtained by deducting in each case from the first cost 3 per cent. per annum since date of erection. This might not, as a general rule, be an unreasonable rate of depreciation, but when ap-

plied to specific cases in Chicago it gave erroneous results. For example, some of the best engines in the city are about 17 years old, and were, therefore, credited in the inventory with only 15 per cent. of their original cost, while others still in operation and not likely to be replaced for several years were given no value at all. The writer in appraising the pumping engines and boilers has tried in each instance to arrive at the fair present value of the particular piece of machinery, due regard being had to all the actual conditions. The other equipments at the several pumping stations as well as the supplies in each case have been valued in accordance with the inventory for January 1, 1906.

EX.—18. ESTIMATED VALUES OF PUMPING STATIONS AND EQUIPMENT.

	Land		*Buildings*	
Station.	*Original value.*	*Present value.*	*Original value.*	*Present value.*
Chicago avenue....	......	$655,900	$150,000	$90,000
Twenty-second st...	......	123,782	74,500	35,000
Sixty-eighth st.....	......	33,000	108,083	75,000
Lake View........	......	75,000	60,000	43,000
Harrison st........	$75,000	80,000	80,000	56,000
Fourteenth st......	200,000	220,000	101,320.50	65,858.33
Springfield ave.....	32,000	35,000	169,500	160,000
Central Park ave...	26,400	30,000	154,500	150,000
Washington Heights	3,000	4,000	6,000	3,000
Norwood Park.....	5,500	5,500	1,100	400
		$1,262,182		$678,458.33

Pumping equipment.

	Boilers		*Pumping engines*	
Station.	*Original value.*	*Present value.*	*Original value.*	*Present value.*
Chicago avenue....	$125,000	$100,000	$478,000	$288,000
Twenty-second st...	9,000	2,000	516,500	20,000
Sixty-eighth st......	Included in cost of engines.	......	331,000	120,000
Lake View.........	16,000	1,000	136,000	54,390
Harrison st........	9,000	500	138,448	70,000
Fourteenth st.......	100,000	100,000	325,746	175,000
Springfield ave.....	Included in engines.	20,000	270,000	175,000
Central Park ave...	In engines.	20,000	270,000	175,000
Washington Heights.	2,500	1,250	4,450	2,500
Norwood Park......	1,600	600	2,205	900
		$245,350		$1,080,790

(6) (H 12a, Chicago.) (See H 23.) To determine the value of mains, a table of unit prices was prepared with the assistance of Mr. W. A. Levering, superintendent, division of water pipe extension; all available records being consulted for the purpose.

For this table, see blueprint, Exhibit 20 (not reproduced here).

The value of the mains was based on the cost of duplication on January 1, 1906, less depreciation. The cost of duplication necessarily includes the cost of replacing the pavement over the mains, which item is stated separately in the table. The cost of pavement was ascertained with the aid of Mr. Joseph A. Moore, assistant engineer, department of public works.

The assumed average width of cut in each kind of pavement for each size of main was based upon a table prepared for a similar purpose by the appraisers of the Omaha water works. The cost per square yard of each kind of pavement was based upon current Chicago prices. Due regard was had to the fact that what is called the "upset price," which is the price for repairing pavements on which the guarantee period has not yet expired, but which may be opened under permit from the city, is fixed by the original contract, and is usually different from the contract price per square yard for the pavement as laid in the first instance. It was also necessary in this connection to ascertain the total lengths of each kind of pavement on which the guarantee period had not yet expired.

Exhibit 19 shows in condensed form the principal pavement data, and is as follows:

EXHIBIT 19. PAVEMENT DATA

Kind of Pavement	*Miles*	*Sq. Yds. to Mile*	*Total Sq. Yds.*	*Current Price*	*Upset Price*	*Total Cost*
Asphalt	69.70	18,515.2	1,290,509.4	$2.04	....	$2,632,639.18
Asphalt	160.15	18,515.2	2,964,981.8	....	$4.00	11,860,705.40
Asphalt block	2.03	18,515.2	37,585.9	2.00	....	75,171.80
Brick	23.00	18,515.2	425,849.6	2.40	....	1,022,039.04
Brick	64.41	18,515.2	1,192,564.0		3.00	3,577,692.00
Cedar block .	580.38	18,515.2	10,745,861.8	1.25	....	13,432,311.73
Concrete	0.24	18,515.2	4,443.6	2.25	....	9,998.10
Creosoted block	....	18,515.2	....	....	....	......
Creosoted block	.80	18,515.2	14,812.2		3.00	44,436.60
Granite	26.90	18,515.2	498,058.9	3.00	....	1,494,176.70
Granite	20.27	18,515.2	375,303.1	....	3.00	1,125,909.30
Macadam	435.80	18,515.2	8,068,924.2	1.25	....	10,086,155.25
Macadam	54.74	18,515.2	1,013,522.0		1.00	1,013,522.00
Medina stone	1.30	18,515.2	24,069.8	3.00	....	72,209.40
Novaculite ..	.28	18,515.2	5,184.3	1.25	....	6,480.38
Novaculite ..	2.22	18,515.2	41,103.7		1.00	41,103.70
Rock asphalt	....	18,515.2	....	....	....	....
Rock asphalt	.57	18,515.2	10,553.7	....	2.00	21,107.40
Slag	3.80	18,515.2	70,357.8	.40	....	28,143.12
	1,489.87	....	27,596,025.8		....	$45,754,447.92

Average price per square yard = $45,754,447.92 ÷ 27,596,025.8 = $1.658.

	Diameter of Pipe (inches)													
	4	6	8	10	12	14	16	18	20	24	28	30	36	48
Average width of opening in pavement (inches)	36	38	40	42	44	46	49	52	55	62	67	70	80	100
Area in square yards per lineal foot of opening	.33	.35	.37	.39	.41	.43	.45	.48	.51	.57	.62	.65	.74	.92
Average price per square yard of pavement	$1.66	$1.66	$1.66	$1.66	$1.66	$1.66	$1.66	$1.66	$1.66	$1.66	$1.66	$1.66	$1.66	$1.66
Average price per lineal foot of opening	.55	.58	.61	.65	.68	.71	.75	.80	.85	.95	1.03	1.08	1.23	1.53
Percentage of mains under pavement	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Average price of pavement per lineal foot of mains	$0.44	$0.46	$0.49	$0.52	$0.54	$0.57	$0.60	$0.64	$0.68	$0.76	$0.82	$0.86	$0.98	$1.22

It is believed that the estimate of the cost of duplication of the Chicago mains is probably more nearly accurate than any other single item of the appraisal, but it must be conceded that the same confidence is not felt in the accuracy of the estimated percentage of depreciation of the mains. After much time spent in consideration of all the available data which might throw any light on the subject, this depreciation has been estimated at 25 per cent.

Exhibit 21 shows the estimated cost of duplicating the existing system of mains and their estimated present value after allowing for depreciation.

EXHIBIT 21. ESTIMATED VALUE OF MAINS.

Size of Main (Inches).	*Total Length of Main (Feet)*	*Cost Per Lineal Foot of Main, Including Pavement*	*Total Cost*	*Estimated Per Cent. of Depreciation.**	*Present Value*
4	862,740	$1.18	$1,018,033.20	......	$763,524.90
6	5,901,200	1.42	8,379,704.00	......	6,284,778.00
8	2,191,405	1.69	3,703,474.45	......	2,777,605.84
10	30,820	2.06	63,489.20	......	47,616.90
12	630,130	2.48	1,561,023.70	......	1,170,767.77
14	28,000	2.92	81,760.00	......	61,320.00
16	369,880	3.40	1,257,592.00	......	943,194.00
18	1,420	4.05	5,751.00	......	4,313.25
20	8,630	4.65	40,129.50	......	30,097.12
24	368,080	6.19	2,278,415.20	......	1,708,811.40
28	280	7.83	2,192.40	......	1,644.30
30	40,890	8.44	345,111.60	......	258,833.70
36	236,285	10.77	2,544,789.45	......	1,908,592.09
48	3,110	17.36	53,989.60	......	40,492.20
Total value of mains......			$21,343,465.30		$16,007,591.47

(7) (II 15, Chicago.) See also II 122. Most of the hydrants which are in use in Chicago, and practically all the valves of from 4-inch to 24-inch inclusive, have been built from patterns designed many years ago, by former City Engineer Cregier. These hydrants and valves are built at the water works repair shop, owned and operated by the city. The repair shop sells the hydrants and valves to the bureau of water at actual cost plus 10 per cent. for wear and tear on tools and plant. As the prices quoted on these valves and hydrants seemed excessive, quotations were asked from two of the most reputable manufacturers of similar goods, and a comparison of these quotations shows that the city has been paying considerably more for the valves and hydrants which it makes than it would have had to pay for the same sizes of valves and hydrants in the open market.

As the valves and hydrants on which quotations were obtained were, in the writer's opinion, at least as good as those made by the city, the best prices, quality considered, at which these goods could have been bought on January 1, 1906, were taken as the basis for this appraisal.

---

*25 per cent. on the system of mains as a whole.

In this connection it may be further stated that 80 per cent. of all the hydrants in Chicago are of the old Cregier pattern and have no frost jacket. The barrel of this hydrant cannot be removed except by taking out the bolts in the bottom of the hydrants. To give access to these bolts and to protect the hydrants from frost, it has been found necessary to set these hydrants in circular brick basins drained to the sewer, and to fill the bottoms of these basins with manure every fall. This manure has to be removed every spring after freezing weather is over. The average cost of these brick basins is about $35 each. The cost of placing manure in the basins last fall was 92 cents per hydrant for about 18,500 hydrants, or about $17,000. The cost of removing the manure in the spring was approximately the same, so that besides the first cost of these basins, which amounts to about $647,500, the cost of this type of hydrant entails in round numbers an annual expense to the city of $34,000.

Hydrants of all the best types obtainable in the market, in use in many cities having colder climates than Chicago, do not require these brick basins nor the annual packing with manure to prevent their freezing. Accordingly, in this appraisal no credit is given for the brick basins, but an allowance is made of $10 per hydrant for setting and for providing for draining the drip from the hydrants. This allowance is believed to be liberal.

EXHIBIT 22.

This exhibit shows prices paid by city of Chicago for hydrants and valves built by the city water works repair shop as compared with prices quoted on hydrants and valves of same size by reputable outside manufacturers.

HYDRANTS.

Description.	*Price as Manufactured by City Water Works Repair Shop.*	*Prices Quoted by Outside Manufacturers.*	
Single, 2½-inch	$23.62	$21.00	......
Double, 2½-inch	44.82	36.00	......
		With 7-in. barrel.	With 8-in. barrel.
Double, 3½-inch	50.87	44.25	$51.37
		With 7-in. barrel.	With 8-in. barrel.
Double, 4-inch	50.87	44.25	51.37

VALVES.

	4-inch.	6-inch.	8-inch.	*10 inch.	12 inch.	*14 inch.	16 inch.	*18 inch.	*20 inch.	24 inch.	*30 inch.	*36 inch.
Prior to Jan. 1, 1900. Price as manufactured by City Water Works Repair Shop.	$13.00	$14.50	$28.00	....	$42.00	....	$85.00	....	....	$113.00	....	....
Price as manufactured by City Water Works Repair Shop after Jan. 1, 1900.	10.07	22.53	32.50	....	58.50	....	122.22	....	....	214.00	....	....
Prices quoted by outside manufacturer Jan. 1, 1900.	5.32	7.98	14.08	$25.94	33.25	$35.34	75.37	$90.75	$113.05	150.00	$319.20	....
Prices quoted by another outside manufacturer	7.65	13.50	18.00	27.00	44.50	55.00	63.00	92.25	108.90	168.75	292.50	450.00

* City does not manufacture.

EXHIBIT 23.

ESTIMATED VALUE OF VALVES, VALVE BASINS, HYDRANTS AND SETTING.

VALVES.

Size of valve (inches).	*Number of valves.*	*Cost of each valve.*	*Total cost of valves.*
4	1,240	$7.65	$9,486.00
6	9,740	12.50	120,750.00
8	3,892	18.90	73,258.80
10	50	27.00	1,350.00
12	928	34.20	31,737.60
14	30	55.00	1,650.00
16	290	64.00	18,560.00
20	4	108.90	435.60
24	200	168.75	33,750.00
28	1	270.00	270.00
30	26	292.50	7,605.00
36	99	459.00	45,441.00

	$344,294.00	
Less 30 per cent. for estimated depreciation	103,288.20	
		$241,005.80
16,500 valve basins at $32.50.....	$536,250.00	
Less 10 per cent. for estimated depreciation	53,625.00	
		482,625.00
Total.................................		$723,630.80

HYDRANTS.

Number of hydrants.	*Estimated cost of setting.*	*Cost of each hydrant.*	*Cost of hydrant and setting.*	*Total cost of hydrants and setting*
4,242	$10	$21	$31	$131,502
15,658	10	36	46	720,268
600	10	44.25	54.25	32,550
20,500				$884,320
Less 15 per cent. for estimated depreciation..........				132,648
Total.................................				$751,672

Grand Total.

Present avlue of valves and basins...............	$723,630.80
Present value of hydrants and setting............	751,672.00
Total................................	$1,754,302.80

(8) (H 44a, Chicago.) Extract from Exhibit 6, pp. 10-11. Report of Mr. W. A. Levering, superintendent of division of water pipe extension.

FIRE CISTERNS.

Where it is desired to concentrate a large number of fire streams at one point, fire cisterns are used instead of hydrants. In the downtown district these cisterns are numerous and are to be found in localities throughout the city where building is congested. The fire cisterns used by the city consist of a six-foot diameter brick cistern about six feet deep, with a 6-inch or 8-inch supply pipe from the water main in the street running into it at the bottom. On the water pipe in the cistern there is a gate-valve which can be operated by a key from the surface of the street. These gate valves are generally operated by the fire department in case of fire. The cisterns are provided at the top with an overflow into the sewer and with a 4-inch drain at the bottom. The capacity of the fire cistern is about 1,000 gallons at high water level. In the city there are 107 fire cisterns, of which number five were installed during 1905.

(2) (H 29 to H 47, Cleveland.) The appraisal of lands is based on the estimated value on December 31, 1905. The appraisal of the physical value of the structural features of the plant is based on the cost of duplication on December 31, 1905, at current prices for material and labor, with due regard to the state of the art and with deductions for depreciation. In the appraisal of the values of lands, cribs, tunnels, buildings, machinery, and meters, the writer was assisted by Messrs. Schulz, Gaffing and Jaeger, engineers in the water works division.

The largest single item of value was the mains, and Exhibits 4, 5, 6, 7 and 8, attached hereto, show in detail the method of their appraisal. (All reproduced except Exhibit 7.)

EXHIBIT 4.

Statement showing increase in pipe, valves and hydrants during 1905.

The total increase in the pipe system during the past year (1905) was 42 miles and 2,310 feet, as follows:

	Miles.	*Feet.*
Increase in low service system by pipe laid by this department	4 and	1,255
Increase in first high service system by pipe laid by this department	13 and	4,301
Increase in second high service system by pipe laid by this department	1 and	211
Total increase	18 and	481
Increase in low service system by annexation of Glenville	19 and	629
Increase in first high service system by annexation of South Brooklyn	4 and	3,273

Increase in first high service system by annexation of part of Newburg Heights village	1,203
Total gained by annexation	24 and 1,828
Total increase in pipe system	42 and 2,319

The small increase of pipe in the low service district is accounted for by the fact that 5 miles and 296 feet of pipe from 12-inch to 4-inch, inclusive, was changed from the low service to the high service system during the year.

The total pipe in use December 31, 1905, was..... 649,957 miles.

The total number of fire hydrants in use December 31, 1905, was	7,642,
An increase over the previous year of	577,
Acquired as follows:	
Increase in low service district by this department	118
Increase in first high service district by this department	184
Increase in second high service district by this department	4
Total	306
Acquired in low service district by annexation of Glenville	201
Acquired in first high service district by annexation of South Brooklyn	66
Acquired in first high service district by annexation of part of Newburg Heights village	4
Total acquired by annexation	271
Total increase for the year	577

Sixty-one hydrants were changed from the low service system to the first high service system.

The total number of valves in use December 31, 1905, was	14,256
An increase over the previous year of	983
Acquired as follows:	
Increase in low service district by this department	214
Increase in first high service district by this department	310
Increase in second high service district by this department	9
Total	533
Acquired in low service district by annexation of Glenville	336
Acquired in first high service district by annexation of South Brooklyn	109
Acquired in first high service district by annexation of part of Newburg Heights village	5
Total acquired by annexation	450
Total increase for the year 1905	983

One hundred and fourteen valves were changed from the low service system to the first high service system.

The total length of pipe lowered during the past year was 8 miles 1,113 feet.

Number of feet of service connections lowered was 6 miles 4,224 feet.

Total trenches dug and refilled by the pipe laying department was as follows:

	(*Feet.*)
For pipe laid in the low service district	58,181
For pipe laid in the first high service district	43,910
For pipe laid in the second high service district	5,492
For lowering pipe	43,353
For lowering service connections	35,904
For changing pipe and laying temporary pipe on account of grade crossing elimination	6,214
For changing and moving hydrants	950
Total	194,004

equal to 36.473 miles.

The report of the engineer in charge of the pipe laying department shows in detail the location of all pipe laid and valves and hydrants set and all changes made.

For Exhibit 5, showing total mileage of mains and pipe in all districts, see answers to H 23 and H 24, preceding.

EXHIBIT 6. PAVEMENT DATA.

Kind of Pavement.	*Miles.*	*Total sq. yds.*	*Contract Price.*	*Upset Price.*	*Total Cost.*
Medina dressed stone on sand	48.078	1,156,541	$3 15	....	$3,643,104 15
Medina dressed stone on sand		57,298	....	$3 46	198,251 08
Medina dressed stone on concrete	5.030	63,646	3 74	....	238,036 04
Medina dressed stone on concrete		48,515	....	4 11	199,396 65
Common medina stone on sand	37.555	942,906	2 61	....	2,460,984 66
Common medina stone on sand		......	....	2 87	....
Common medina stone on concrete	.850	9,378	3 20	....	30,009 60
Common medina stone on concrete		16,893	....	3 52	59,463 36
Brick on sand	157.613	1,716,925	1 05	....	1,802,771 25
Brick on sand		546,850	....	1 15	628,877 50
Brick on sand in 1905		402,620	....	1 21	487,170 20
Brick on concrete	10.421	87,941	1 89	....	166,208 49
Brick on concrete		34,536	....	2 08	71,834 88
Brick on concrete in 1905		49,473	....	2 17	107,356 41
Tar macadam	.390	......	2 10	....	....
Tar macadam		7,022	....	2 31	16,220 82
Bitulithic	.381	......	2 10	....	....
Bitulithic		10,329	....	2 31	23,859 99
Asphalt	22.905	80,093	2 25	....	180,209 25
Asphalt		336,825	....	2 48	835,326 00
	283.223	5,567,791			$11,149,080 33

Average price per square yard = $11,149,080.33 ÷ 5,567,791 = $2.00.

	Diameter of Pipe (inches)											
	4	6	8	10	12	16	20	24	30	36	42	48
Average width of opening in pavement (inches)	36	38	40	42	44	49	55	62	70	80	90	100
Area in square yards per lineal foot of opening	.33	.35	.37	.39	.41	.45	.51	.57	.65	.74	.83	.92
Average price per square yard of pavement	$2.00	$2.00	$2.00	$2.00	$2.00	$2.00	$2.00	$2.00	$2.00	$2.00	$2.00	$2.00
Average price per lineal foot of pavement	.66	.70	.74	.78	.82	.90	1.02	1.14	1.30	1.48	1.66	1.84
Per centage of mains under pavement	50	50	50	50	50	50	50	50	50	50	50	50
Average price of pavement per lineal foot of mains	$0.33	$0.35	$0.37	$0.39	$0.41	$0.45	$0.51	$0.57	$0.65	$0.74	$0.83	$0.92

(II 41. See also II 64. Exhibit IX, table showing size and kind of public and private meters in use on December 31, 1905.)

	Size in Inches									
	8	6	4	3	2	1½	1	¾	⅝	Total
Trident	..	..	10	22	111	61	308	830	38,749	40,100
Crest	2	8	24	20	4	..	..	..	..	58
Hersey	..	5	21	11	29	81	160	265	7	579
Hersey Disc	..	..	..	..	4	8	8	47	184	251
Torrent	..	4	21	12	11	..	..	..	..	48
Worthington Class II	..	2	..	..	..	..	1	6	..	9
Worthington Class III	..	..	71	128	290	323	488	944	21	2,291
Worthington Class IV	..	..	..	..	..	..	..	..	31	31
Worthington Disc	..	..	..	..	..	33	..	9	9	51
Empire	..	5	7	8	6	..	47	160	542	774
Nash	..	..	..	..	..	..	1	1	18	20
Crown	..	4	4	..	..	..	7	5	12	32
Gem	..	..	1	1	..	..	..	..	..	2
Pittsburg	..	..	..	1	..	..	..	10	..	11
Keystone	..	..	..	1	5	..	..	..	18	24
Columbia	..	..	..	..	..	..	..	..	5	5
Union	..	..	..	..	1	..	..	2	2	5
Lambert	..	..	..	1	4	8	29	27	205	295
Thomson	..	..	1	..	1	..	1	..	..	3
Cincinnati	..	..	..	..	..	..	..	2	3	5
American	..	..	..	..	..	..	..	..	5	5
	2	25	165	205	502	524	1,011	2,359	39,781	44,599

EXHIBIT 8.

(Cleveland appraisal, H 42.) Estimated value of cast iron mains.

Size of Main. (Inches.)	*Total Length Mains. (Feet.)*	*Lineal Foot of Main, Including Pavement.*	*Total Cost.*	*Present Value.**
4	201,240	$1.07	$215,326 80	
6	1,911,922	1.31	2,504,617 82	
8	504,291	1.61	811,908 51	
10	236,136	1.99	469,910 64	
12	134,640	2.35	316,404 00	
16	118,339	3.32	392,885 48	
20	29,410	4.53	133,227 30	
24	42,389	5.76	244,160 64	
30	117,031	7.70	901,138 70	
36	67,823	10.14	687,725 22	
42	23,639	13.10	309,670 90	
48	25,793	16.00	412,688 00	
			$7,399,664 01	$5,549,748 01

TOTAL METERS AND INDICATORS IN USE.

Total city meters in use December 31, 1905	44,167
Total private meters in use December 31, 1905	402
Elevator indicators in use December 31, 1905	137
Total	44,706

There are also 192 re-registering and 37 building contractors' meters on the books.

(H 43. See also H 64.) EXHIBIT 10, showing the meters on the different classes of services on March 28, 1906.

Business	2,604	
Churches	172	
Schools	63	
Church and school	12	
Church and dwelling	23	
Tenement and dwelling	36,547	
Dwelling and business	4,530	
Street washers	20	
Fish ponds, hydrants and fountains	6	
Township	25	
Fire lines	6	
Free meters supplying city uses	427	
		44,435

(10) *Syracuse.* Appraisal of plant.

H 30-47.

Nearly one-quarter of the total present value of the plant is represented by the items for land including legal and court expenses, damages, etc., and for salaries, fees and miscellaneous expenses in general construction. In the appraisal these items were put in at cost as shown by the books and records available. In arriving at the present physical value of the structural features of the plant, the instructions under the heading "Inquiries 41 to 47" on page 3 of the schedule were kept in mind. The fact that most of the work of construction was done at a time when material and labor were much cheaper than now, resulted on the one hand in large additions to the estimated cost of duplication, while on the other, the present value was considerably reduced by depreciation. In some items, most of the estimated depreciation was due to consideration of "the value of the plant in view of the latest processes and newest inventions." For example, were a plant now to be built for the same service as that afforded by the existing one, a large saving would be effected by the use of wood stave pipe, instead of steel riveted pipe for the 6,410 feet of 54-inch intake laid under the lake and instead of the 30-inch cast iron pipe in such portions of the conduit line as would not be subjected to pressures greater than about 75 pounds per square inch. As, at the time of the construction of the intake and conduit line, wood stave pipe, although it had long been in use in the far West, was practically unknown in the East, the above mentioned deduction for depreciation implies no criticism whatever on the work of the eminent engineers who designed the plant.

---

* Estimated per cent. of depreciation: 25 per cent. on all the system of mains as a whole.

A further cause for depreciation of a somewhat similar sort is the fact that the law which formerly limited the size of the conduit line to 30 inches added greatly to the cost of its upper portion, by reason of the necessity previously referred to, for deep excavation to keep the conduit below the hydraulic grade line. Had the city then had the right, as would now be the case, to increase the size of the upper two miles of the conduit, that part of the hydraulic grade line could have been raised, and the deep and costly excavations, shown in plates IV and V (not reproduced), could have been avoided. In estimating the cost of the plant, the writer was greatly assisted by Mr. George H. Beebe, Deputy City Engineer; Mr. W. J. Daly, Clerk Water Bureau; Mr. John Venner, Chief Inspector Water Bureau, and by Mr. Douglas Dewar, representing Messrs. Marwick, Mitchell & Co., the expert accountants for the National Civic Federation.

(H 42.) EXHIBIT 5.

PAVEMENT DATA.

Kind of pavement	*Total square yards*	*Length*	*Total cost*	*Ave. cost per square yard*
Brick out of bond......	144,771	37,384	$304,802	$2.105
Brick under bond......	226,981	60,575	441,115	1.955
Asphalt out of bond....	434,562	113,239	1,084,417	2.495
Asphalt under bond....	135,468	11,198	251,000	1.851
Sandstone out of bond..	25,676	......	62,792	2.397
Sandstone under bond..	9,647	......	29,969	3.108
Asphaltine out of bond..	65,183	19,911	98,560	1.515
	1,051,282	268,627	$2,272,582	$2.164
Say	1,050,000	268,000	$2,275,585	$2.17

Average price per square yard equals—
$2,275,585 ÷ 1,050,000 = $2.17.

(H 42.) EXHIBIT 7.

ESTIMATED VALUE OF MAINS (INCLUDING VALVES).

Estimated value of mains.

Size of Main. (Inches.)	*Total Length Mains. (Feet.)*	*Cost Per Lineal Foot of Main, Including Pavement.*	*Total Cost.*	*Present Value.**
4	38,750	$0.91	$35,262 50	$29,973 13
6	226,480	1.14	258,187 20	219,459 12
8	310,530	1.37	425,426 10	361,612 19
10	110,008	1.69	185,913 52	158,026 49
12	99,389	2.07	205,735 23	174,874 94
16	68,875	2.91	200,426 25	170,362 31
20	51,349	4.05	207,963 45	176,768 93
24	23,993	5.32	111,682 76	94,930 35
30	8,011	7.66	61,364 26	52,159 62
36	11,899	9.02	107,328 98	91,229 63
Total value of mains....			$1,799,290 25	$1,529,396 71

Estimated cost of valves, including boxes, stones and basins..................................	$82,000 50
Less 20 per cent. for depreciation.................	16,400 10
Present value..................................	$65,600 40
Present value of mains, including valves............	$1,594,997 11

SANITARY CONDITIONS.

H 48. Was water purified or filtered, or supplied in its natural condition?

Chicago, Cleveland, Syracuse. Supplied in its natural condition.

Indianapolis. Water from White river, and from Fall creek, was filtered. Water from wells was not filtered.

New Haven. Water supplied in its natural condition during 1905. Filters on Lake Whitney supply were not started till 1906.

H 49. Were settling tanks or basins used?

Chicago, Cleveland, Syracuse, New Haven. No.

Indianapolis. No, but about 7¼ miles in length of the White River canal provided a certain amount of sedimentation.

H 50. What processes of purification or filteration were used?

Chicago. Diversion of sewage by sanitary canal. (See H 158 G.)

Extract from *Exhibit I,* water supply system of Chicago, by John Ericson, city engineer of Chicago, May, 1905. Page 46.

"The construction and opening of the drainage canal, an undertaking that when fully completed will have cost the citizens of Chicago over sixty million dollars, and the extensive intercepting sewer systems, another undertaking, that when finally completed will have cost an additional five million dollars, were all undertaken principally for the purpose of insuring the purity of the city's water supply.

---

* Estimated per cent. of depreciation: 15 per cent. on all the system of mains as a whole.

That all these costly constructions have not been in vain, the statistics of the health department of the city will show. The percentage of deaths from typhoid fever in Chicago, which in 1891, or before the four mile tunnel was put in use, had reached a figure greater than in any of the larger cities in the Union, showed in 1893 and subsequent years, a decrease that is remarkable. The opening of the drainage canal and part of the intercepting sewers each caused an additional decrease in deaths from typhoid fever, which in nearly all cases is caused by the impurity of a domestic water supply. The location of the intakes two or three miles from shore will, in my opinion, in the future insure a wholesome supply of water."

Extract from Exhibit 5, city of Chicago, bulletin of the department of health, March 17, 1906, etc., page 1: "It should be a source of satisfaction to Chicago's citizens—who have furnished the money—to learn that the expenditure of the $49,716,867.94 up to the close of the last year, 1905, in the construction of a main drainage channel for the sanitary disposal of the city's sewerage, and the consequent protection of its water supply from pollution, is fully justified by the results.

During the four years prior to the opening of the drainage canal, in January, 1900, the city water supply averaged only 31.6 per cent "safe," and the deaths from typhoid fever averaged 57.4 in every hundred thousand of the population, while the deaths from diarrheal diseases—also largely due to polluted drinking water—averaged 167.4 in every hundred thousand.

During the six years of the operation of the tunnel, 1900-1905, the water supply has been 74.2 per cent "safe." The typhoid deaths have been 26.6 and the diarrheal deaths have been 123.8 in the hundred thousand of population. Had the rates of the first period continued throughout the second, there would have been 4,106 deaths from typhoid, and 18,400 from the diarrheal diseases.

There actually occurred 1,902 from typhoid and 15,609 from diarrhea—or a saving of 5,995 lives from these two causes of death during the operation of the drainage canal.

At the 1903 session of the Illinois General Assembly, the value of a human life was fixed by statute at two thousand dollars. On this basis, a return of $11,990,000 on the investment of less than fifty million by the sanitary district is demonstrated."

Cleveland, Syracuse. None.

Indianapolis. Slow sand filtration without coagulation.

Description of Filter Plant

The filters as originally designed consisted of three open beds, of 1 6/10 acres each, with a covered clear water reservoir between beds one and two, and a second clear water reservoir south of bed three, provision being made for the addition of a fourth bed south of this second reservoir. The experience during the cold winter of 1904 and 1905 proved the advisability of roofing the filters, and of subdividing the beds into smaller units. Accordingly beds one and two have already been made into four beds, of .8 of an acre each, now numbered one, two, three and four respectively, and have been covered with a reinforced concrete roof, with two feet of cinders on top. Original bed three is now being subdivided into beds five and six, and is being similarly covered. * * * *

The engineering features of the construction of the filter plant have been fully described in papers published in Municipal Engineering for April, 1905, and in Engineering News of April 26, 1906—exhibits 3 and 4, both written by Mr. William Curtis Mabee, construction engineer of the Indianapolis Water company.

(Exhibits 3 and 4 not reproduced here.)

New Haven. None.

H 51. What proportion of the water was treated by each process?

Chicago. The diversion of sewage by sanitary canal was designed to purify the lake water.

Cleveland, Syracuse and New Haven. None.

Indianapolis. About two-thirds of the total amount supplied was filtered water, the balance was well water.

H 52. If filtration beds were used, how often were they cleaned?

Chicago, Cleveland, Syracuse, New Haven. No filtration beds used in 1905.

Indianapolis. Minimum time between cleanings of any filter, twenty-one days; maximum time between cleaning of any filter beds, sixty-seven days.

H 53. If mechanical filters were used, how often were they washed?

No mechanical filters used in any of the plants.

H 54. Were the methods of maintenance, repair and cleansing of purification works such as to keep them in good condition?

Chicago. No purification works, except the sanitary canal referred to in H 50.

Cleveland. There were no purification works in use; intercepting sewers intended to divert sewage from vicinity of cribs in process of construction, but only about one-third completed.

Syracuse. No purification works.

Indianapolis. Yes, excellent.

New Haven. No purification works in 1905.

H 55. If sanitary inspections were made of the sources of supply, state by whom and when.

Chicago. See H 57 and H 58.

Cleveland. Report by Dr. George C. Whipple, dated July 1, 1905, was made after several months spent in study of the source of supply, and of the conditions affecting the quality of the water.

The public health department of the city of Cleveland is governed by a board of five members, appointed by the mayor and confirmed by the city council. The term of service is five years, one new member being appointed each year. The health department is entirely separate from the division of water. It has strong legal powers and can enforce its orders to an unusual extent. The city bacteriologist, Dr. W. T. Howard, Jr., and the city chemist, Mr. William Pate, Jr., report directly to the health officer, Dr. Martin Friedrich. Summaries of chemical and bacteriological analyses are attached hereto as Exhibits 11 and 12, respectively. Dr. Howard says that the water "cannot be called a good water, a safe water," also that 90 per cent. of the intelligent people in fairly good financial circumstances do not drink it. He cites instances of prominent physicians who forbid their patients to drink it, and who, when typhoid is raging in the city, have at most only one or two cases. Mr. H. O. Way, assistant city bacteriologist, who, under the supervision of Dr. Howard, made the bacteriological analyses of the water in 1905, states that the presence of the colon bacillus may be reasonably assumed as cause for classing the water as unsafe, it being understood that the word "unsafe" does not necessarily always mean that the water is actually bad or unfit to drink. Similarly the absence of colon bacillus should fairly cause the water to be classed as "safe," although the water might possibly be bad without the colon bacillus being found in the particular sample examined. The general average, however, of all examinations indicates that the percentage of times the colon bacillus is found in the water may be fairly taken as the percentage of times that the water is unsafe. Mr. Way further states that observation of all the other local conditions affecting the water in Cleveland has borne out the statement that when the colon bacillus is found in the city supply, the water should be called unsafe. Mr. Way found the colon bacillus twelve times in 365 examinations of city water during 1905.

An extract from report dated July 1, 1903, of Dr. George C. Whipple, consulting engineer to the Superintendent of the water works division, is attached hereto as Exhibit 13 (reproduced in part below). Dr. Whipple was employed by the city to investigate the existing water supply, and its probable future quality after the completion of the intercepting sewers. Dr. Whipple's opinion of the water will be found under the caption "general results" in the first part of the Exhibit 13. That portion of the full report for 1905 of the health officer, Dr. Martin Friedrich, in which he treats of the quality of the city water, is attached hereto as Exhibit 14 (See II 60). In view of all the foregoing facts and opinions it would seem that the water is good almost all the time, but that its purity cannot be always relied upon, as it is subject on infrequent occasions to sudden changes from good to bad. The water should, therefore, in the writer's opinion, be classed as fair.

(H 60.) EXHIBIT 11; CHEMICAL ANALYSES OF SAMPLES OF LAKE WATER. TAKEN AT KIRTLAND STREET PUMPING STATION, CLEVELAND, O., BY MR. WM. PATE, JR., CITY CHEMIST.

In parts per million.

Date Taken, 1905.	Nitrogen as— *Free Ammonia.*	*Albuminoid.*	*Nitrates.*	*Nitrites.*	*Oxygen Consumed.*	*Chlorine.*	*Total Solid.*	*Loss on Ignition.*	*Fixed Solids.*
Jan. 4	....	.424	.100	....	2.97	4.85	215.0	28.0	187.0
Jan. 11	....	.156	.230	....	2.00	6.58	157.5	81.0	77.5
Jan. 18	....	.168	.240	....	1.64	6.72	145.10	40.5	104.5
Jan. 25	....	.200	.150	....	1.62	6.30	116.5	85.5	31.0
Feb. 1	....	.220	.100	....	2.30	5.00	116.5	28.5	88.0
Feb. 8	....	.248	.220	....	1.87	7.85	130.0	25.0	105.0
Feb. 15	....	.116	.320	....	2.07	8.85	168.5	90.0	78.5
Feb. 21	....	.228	.170	....	1.97	7.57	159.5	60.0	99.5
Mar. 1	....	.094	.100	....	1.57	6.44	195.5	72.5	123.0
Mar. 8	....	.160	.100	....	2.12	7.15	185.0	75.0	110.0
Mar. 15	....	.190	.250	....	2.17	6.86	198.5	88.0	111.5
Mar. 22	....	.200	.190	....	2.02	7.71	210.5	42.5	168.0
Mar. 29	....	.130	.170	....	2.07	6.86	183.5	137.5	46.0
Apr. 5	.060	.168	.160	....	1.92	5.30	113.5	25.0	88.5
Apr. 12	....	.132	.150	....	2.12	4.90	155.0	100.0	55.0
Apr. 19	....	.174	.200	....	1.62	8.8	200.0	124.0	76.0
Apr. 26	....	.180	.160	....	1.87	11.2	204.0	111.0	93.0
May 3	.082	.140	.230	....	2.07	8.8	143.0	71.5	71.5
May 10	.052	.090	.520	....	1.97	8.0	142.0	80.5	61.5
May 17	.024	.112	.390	....	2.32	8.8	171.5	100.0	71.5
May 24	.130	.178	.300	....	1.87	7.8	150.5	75.5	75.0
May 31	.044	.092	.180	....	1.77	9.4	152.5	77.5	75.0
June 7	.032	.086	.489	....	1.62	8.4	130.0	72.5	57.5
June 14	.040	.108	.640	....	1.97	8.0	....	....	....
June 21	.066	.100	.100	....	1.22	8.8	150.0	75.0	75.0
June 28	.062	.112	.200	....	2.62	7.9	125.0	55.0	70.0

Date Taken 1906.	Nitrogen as Free Ammonia	Nitrogen as Albuminoid	Nitrogen as Nitrates	Nitrites	Oxygen Consumed	Chlorine	Total Solids	Loss on Ignition	Fixed Solids
July 5	.050	.220	.130	....	2.07	7.2	143.0	55.0	88.0
July 12	.020	.240	.280	....	2.93	6.4	129.0	47.5	81.5
July 19	.010	.080	.240	....	1.47	7.4	56.0	30.0	26.0
July 26	.024	.080	.120	....	1.27	7.2	129.5	97.5	32.0
Aug. 2	.024	.118	.170	....	1.97	6.8	110.5	56.0	54.5
Aug. 9	....	.048	.220	....	1.57	6.8	160.0	35.0	125.0
Aug. 16	.012	.134	.240	....	2.22	7.2	215.0	95.0	120.0
Aug. 23	....	.062	.142	....	1.52	8.1	150.0	79.0	71.0
Aug. 30	....	.068	.130	....	1.07	6.8	124.0	50.0	74.0
Sept. 6	....	.058	.100	....	1.47	7.6	126.0	34.0	92.0
Sept. 13	....	.060	.150	....	1.82	8.0	183.0	101.0	82.0
Sept. 20	....	.026	.120	....	1.00	8.0	180.0	57.5	122.5
Sept. 27	....	.090	.100	....	1.80	7.0	112.5	87.5	25.0
Oct. 4	.028	.072	.190	....	1.72	7.2	170.0	57.5	112.5
Oct. 11	.060	.040	.140	....	1.02	7.6	207.5	124.0	83.5
Oct. 18	.010	.060	.180	....	1.70	8.0	257.0	106.0	151.0
Oct. 25	....	.140	.150	....	1.97	7.3	195.0	125.0	70.0
Nov. 1	....	.134	.110	....	1.62	7.2	152.0	68.5	83.5
Nov. 8	.074	.106	.130	....	1.42	7.6	229.0	129.0	100.0
Nov. 15	....	.040	.130	....	1.72	7.6	209.0	117.5	91.5
Nov. 22	.036	.142	.180	....	1.72	8.4	227.5	116.5	111.0
Dec. 6	....	.096	.180	....	1.00	8.4	225.5	100.0	125.5
Dec. 13	.032	.128	.180	....	1.82	8.0	248.0	130.0	118.0
Dec. 20	....	.068	.160	....	1.77	8.4	279.5	146.0	133.5
Dec. 27	.024	.062	.080	....	1.82	8.8	127.0	44.5	82.5

EXHIBIT 12.

(H 55. Cleveland.) (See also H 60.)

Summary of results of bacteriological examinations of Cleveland city water, during 1905, by Dr. W. T. Howard, city bacteriologist:

Year 1905. *Month.*	*Number of Examinations Made.*	*Number of Times Colon Bacillus Was Found.*
January	25	2
February	23	2
March	26	3
April	25	0
May	26	2
June	26	1
July	24	0
August	27	0
September	25	2
October	26	0
November	25	0
December	25	0
Total	303	12

Extract from report of Dr. Geo. C. Whipple, dated July 1st, 1905, P. 25.

EXHIBIT 13.

"During the sixteen months from January, 1903, until May, 1904, there were 4,578 cases of typhoid fever reported to the health department in Cleveland, and 611 deaths. If we assume the true ratio of cases to deaths as 12 to 1, we find that the actual number of cases in the city during that period was 7,332. This is practically one case for every sixty inhabitants of the city. (It would be a very conservative estimate to place the financial loss of the city due to this epidemic as upwards of $3,000,000.)"

After stating that the decrease in the typhoid fever rate kept pace with the increase of the supply of water from the new intake, and that the average rate of deaths from typhoid fever for the year ending June 30, 1905, was 16.8 per 100,000, Dr. Whipple says (page 28): "It is fair to assume that the difference between this death rate of 16.8 per 100,000 and the average death rate during the ten years preceding the epidemic of 1903, which was 37 per 100,000, can be attributed to the improvement in the quality of the water supply."

Syracuse—(H 55).

An employee of the water department, residing in Skaneateles, has charge of gate-house and controlling gates, and also reports to water department violations of sanitary regulations in Skaneateles village and immediate vicinity. Another water department employee, residing on shore of lake about three miles from its lower end, is charged with the patrolling of the lake during the months in summer and fall when the cottages along the shore are occupied, and with reporting violations of sanitary regulations. For copy of these sanitary regulations, see Exhibit 4, attached hereto. (These regulations are summarized in Schedule 1. J. H. Gray.)

During 1905, Dr. W. H. May, city bacteriologist, visited the lake, inspected the shore some six or seven times, and collected about 75 samples of water from different points for bacteriological analysis for the purpose of locating the area of shore line pollution. A committee composed of representatives of the Chamber of Commerce ,local physicians, and others inspected the shore in 1905.

(H 57, 58, and 60.) Quality of water.

The water of Skaneateles lake is naturally pure, soft, and, for lake water, remarkably free from color. The nature of the watershed and its sparse population have so far made it very easy, by occasional inspections of the shore and even the partial enforcement of the existing sanitary regulations for the protection of the supply, to prevent its pollution by those residing on the shores of the lake or along the short streams which are tributary to it.

The village of Skaneateles might naturally be expected to cause some pollution, but this village is at the extreme lower end of the lake. This sewage is taken care of by the small system of intercepting sewers discharging into Skaneateles creek, and the location of the intake crib removes any present possibility of shore line pollution by the offal of the village.

Dr. W. H. May, city bacteriologist, reports that the shore line pollution from Skaneateles village extends out only about one thousand feet southeasterly from the shore, the intake crib being a mile further out. Also that for the rest of the way around the lake the shore line pollution extends out on an average about 150 feet, except off the mouths of Fall brook and Carpenter brook, where it extends out 200 feet, more or less, and opposite Glen Haven at the upper end of the lake, where the maximum extent of the shore line pollution would be about one-quarter of a mile from the Glen Haven hotel. And further, that out of one hundred samples taken at the intake, none have ever shown the slightest trace of fecal matter.

A summary of the results of the bacteriological examinations made by Dr. May in 1905, and a report of the chemical analyses made by the city chemist, Dr. F. E. Engelhardt, during the same period, will be found in Exhibit 5.

EXHIBIT 3. (H 57, 58, and 60.) Summary of results of bacteriological analyses during 1905 of city water from Woodland reservoir by Dr. W. H. May, city bacteriologist:

	Average Number Bacteria Per C. C. at 37 Degrees C., Incubator Temperature. Examinations Made Promptly.		
Month.	*Colon.*	*Sapprophytes.*	*The Number of Samples Examined.*
January	0	9	2
February	0	12	2
March	0	13	2
April	0	15	2
May	0	17	2
June	0	17	4
July	0	21	4
August	0	22	4
September	0	20	4
October	0	19	4
November	0	19	4
December	0	19	4

PART II.

REPORT FOR 1905 OF CHEMICAL ANALYSES OF CITY WATER; DRAWN FROM FAUCET IN CITY LABORATORY BY F. E. ENGLEHARDT, Ph. D., CITY CHEMIST.

Found in 100,000 *parts of water.*

Month.	*Total Solids Left on Evaporation at 212 Degrees Fahrenheit.*	*Clorine.*	*Corresponding to Sodium Chloride.*	*Free Ammonia.*	*Albuminoid Ammonia.*
January	13.30	0.40	0.66	0.00266	0.00660
February	13.00	0.40	0.66	0.00160	0.00660
March	14.60	0.40	0.66	0.00160	0.00660
April	12.20	0.40	0.66	0.00106	0.00560
May	13.20	0.40	0.66	0.00264	0.00720
June	13.30	0.45	0.7425	0.00320	0.00800
July	13.40	0.45	0.7425	0.00212	0.00520
August	12.70	0.40	0.66	0.00264	0.00680
September	12.20	0.40	0.66	0.00160	0.00720
October	13.20	0.40	0.66	0.00320	0.00780
November	13.90	0.40	0.66	0.00160	0.00720
December	12.40	0.50	0.825	0.00240	0.00700
Average	13.125	0.4166	0.6865	0.002193	0.00676

In all of the above water samples, traces of nitrates were present, but in none of them nitrites. (Griess re-agent used.)

Indianapolis. (H 55.)

An employee of the company, with police powers, was charged with the daily patrolling of the canal to see that the laws and ordinances for the protection of the supply were complied with.

New Haven. (H 53.)

Daily inspection of all sources by company's regular inspectors. Inspections at less frequent intervals by various superintendents or other officers of the company. The writer was shown the outside of what appeared to be an exhaustive report on the whole subject of the New Haven water supply, prepared by Dr. Geo. W. Fuller, consulting engineer for the new filter plant, but was not permitted to read the report.

The precautions taken by the water company to safeguard the purity of the supply are admirable. Some of these are described on pages 3, 4 and 6 of Exhibit 2, attached hereto.

Men are kept constantly on duty patrolling the water sheds and cleaning the shores of the various lakes and their tributary streams. Small dams of loose rock are built across the wooded ravines to serve as strainers to catch leaves which the rains would otherwise wash into the lakes. These leaves are removed and burned as necessary. Men with teams collect and remove the manure and other wastes from the highways near the lakes. Others keep the underbrush cleared away for a wide strip above the flow line, and rake the shores to remove all possible objectionable matter. The work of protecting and beautifying the shores of some of the lakes is done under the supervision of the bureau of forestry, Yale university.

By agreement with the N. Y., N. H. & H. R. R. its train closets are kept locked and no garbage is allowed to be thrown from its cars within the limits of the watershed. Each physician or health officer on the watersheds is furnished by the company with a pad of blank forms, a sample of which is attached hereto, as Exhibit 6, and receives $1.00 for each case of typhoid reported on these blanks to the water company's office. Exhibit 7 (not reproduced here) shows notices posted on water sheds. During 1905 the water company spent on the care of its reservoirs, roads, and bridges, $23,183.00, of which about $15,000.00 would be fairly chargeable to the labor account for protecting the purity of its supply. In addition to this, the amount expended for sanitary inspections and analyses shows $2,600.00 for the same year.

EXHIBIT 6. TYPHOID REPORT TO NEW HAVEN WATER COMPANY.

..............................190....

Name of Patient..

Residence..

Diagnosis..

Been sick since..

Have proper directions been given for the disinfection and disposal of all of the excreta?..............................

Name of attending physician..............................

(Signed)..............................M. D.

Health Officer, town of..............................

(Reverse side reserved for remarks.)

(H 55, 60, and 61.)

In the spring of 1901 there occurred in New Haven an epidemic of typhoid fever, the origin and course of which are described in detail in a report by Herbert E. Smith, M. D., of Yale university, attached to original report (Exhibit 4, not reproduced). As shown by Dr. Smith, this epidemic was the result of pollution of the Dawson water by excreta from typhoid patients residing on Carrington Hill. The location of the residence of these persons is indicated by the letter (A) on Plate 1 (not reproduced). About 465 cases and 73 deaths are attributed to this pollution.

The history of this epidemic emphasizes the necessity for extraordinary care in the protection of such water sheds, for the pollution came from a very sparsely populated shed, and one from which very little danger might have therefore been expected. The water company, while minimizing, as is perhaps natural, its responsibility in the matter of the epidemic of 1901, has taken the lesson to heart, as its efforts since that time to protect all of its sources of supply would indicate.

In an interview with Dr. F. W. Wright, president of the New Haven board of health, and its health officer during 1905 and for a number of years previous thereto, that gentleman confirmed in detail the statement contained in the report of Dr. Smith on the epidemic of 1901 already mentioned. Dr. Wright further stated that no analyses of the city supply were made by the local board of health in 1905; that there were 247 reported cases of typhoid fever with 49 deaths; that a number of cases and 5 deaths occurred at the Alms house, which is supplied from Lake Wintergreen, on whose watershed there was no possibility of pollution; and that he has had two outbreaks of typhoid this year directly traceable to milk. Dr. Wright further states that the water company has gone to great expense "in fixing things that look well" and that they have the shores of their lakes in fine shape. He thinks they might improve in some respects the care of their tributary streams before these reach the lake. He was afraid of the supply from Lake Whitney before it was filtered, but danger from that source is now eliminated by the filters, which he considers very efficient. He would consider that, with the exception of Lake Whitney, all the other lakes would be very unlikely to become infected, though infection might possibly occur. For example, the Maltby lakes might, in his opinion, become polluted if conditions happened to be just right. He would not be afraid of the colon bacillus in water, providing it came from animals instead of from human beings, and if colon bacillus were found in Lake Wintergreen, he would consider that it came from animals.

Dr. Wright states that while the water sometimes has some color and taste from vegetable matter, he considers it was good from a sanitary standpoint in 1905, and that the water is not responsible for any of the typhoid at present. Finally, the doctor says that in his opinion, "the New Haven water supply, as a whole, compares very, very favorably with that of almost any other city."

In an interview with Mr. Ward Bailey, clerk of the New Haven board of health, Mr. Bailey (who is also secretary of the Union League club) states that the company takes extraordinary precautions to protect its source of supply, and that he believes its water is better than many of the bottled drinking waters. He attributes the rather widespread use of the latter partly to the scare resulting from the epidemic of 1901, partly to the color and taste which the city water sometimes has, especially in spring time from vegetable matter, and partly to active advertising on the part of the sellers of bottled waters. He considers that the city water was pure from a sanitary standpoint in 1905. Report of the New Haven health department of 1905 is attached hereto as Exhibit 5. (Exhibit not reproduced.)

In an interview with Dr. H. E. Smith of Yale University, who is the consulting chemist of the New Haven water company, Dr. Smith states that during 1905 he made chemical analyses from each source of supply monthly, and bacteriological analyses monthly from Lakes Dawson and Whitney, and frequently from other sources. Mr. W. J. Connor, superintendent of filters for the company, makes daily bacteriological analyses of Lake Whitney raw water and of the effluent from each of the beds and also from the clear water basin, and from the Whitneyville pumping stations. As a rule, Mr. Connor also makes bacteriological analyses of the effluent from Prospect Hill reservoir.

Dr. Smith states that colon bacillus is sometimes found in the water from each of the different sources of supply, including even Lake Wintergreen, but that he considers it probable that most of the colon so found has come from animals and he regards the colon from animals as harmless. He believes that the company's system of inspection of water sheds is pretty well carried out, as they are prompt to notify him of any suspected sources of contamination, and that the inspectors are good men for this work. He thinks that on the Dawson and Whitney sheds the inspection might not be regarded as perfect by reason of the fact that it would not be possible to insure that absolutely no pollution should occur. Whitney water is now filtered. On the Maltbys, Wintergreen and Saltonstall sheds he thinks that the inspection might be considered reasonably sufficient. Dr. Smith states further that the water has been better since 1901 than ever before; that the typhoid rate was higher than is now usual in 1905, but that he does not think that water was an important factor in the 1905 rate. Dr. Smith regards the water in 1905 "as very good in sanitary quality."

As already stated, the typhoid rate in 1905 was somewhat higher than the average for the last few years. The writer of this report was not, however, able to find any competent evidence of the fact that the increase was due to the water supply. In view of all of the foregoing facts and opinions, the writer of this report would rate the purity of Lake Whitney water during 1905 as fair, and of that from the other four water sheds as good. Now that the Lake Whitney water is filtered, all the water should, in the writer's opinion, be classed as good.

H 56. How much land is owned for the sanitary protection of the supply?

Chicago. No land is owned for sanitary protection of the supply. It is unnecessary.

Cleveland. None.

Syracuse. No land owned as yet around Skaneateles lake. Woodland reservoir tract contains 51.23 acres.

Indianapolis. About 530 acres (Exhibit 11), as follows: Land around Riverside pumping station, 240 acres; around filtration plant, 83 acres; at and about Broad Ripple dam, distributed principally in narrow strips along the shore for riparian protection, 62 acres; below Broad Ripple dam in narrow strips as before, 6 acres; canal strip, 130 acres; at and near dam on Fall creek, 9 acres; total, 530 acres.

New Haven. About 7,000 acres. (See H 2.)

H 57. How often were chemical and bacteriological analyses of water made?

Chicago. (See H 58, 59 and 61.) Daily, except Sundays and legal holidays. The health department of the city of Chicago is an entirely separate organization from the bureau of water, and from the sanitary district of Chicago. Samples of the water are collected by the health department at all of the pumping stations at about 8 A. M. each day, except on Sundays and legal holidays. These samples are usually in the laboratory by 9 A. M. and a sanitary chemical analysis, as well as a bacteriological analysis, is made of each sample. The sanitary chemical analyses are usually completed before noon, and the health department classes the water from each station "safe" or "unsafe" according to the results of the sanitary chemical analysis. A report of this classification is then made to the office of the sanitary district of Chicago and telephoned to the city press, and every paper in the city publishes as soon thereafter as possible a complete notice of the condition of the supply from each pumping station. This notice has its regular place in each paper, and is usually to be found in the second column of the front page. As forty-eight hours would be required to complete the bacteriological analyses, their results are not published. As stated in the report of the city chemist (Exhibit 7, See H 60), the word "unsafe" does not necessarily always mean that the water is bad, or unfit to drink.

The writer is informed that the city supply is used for drinking purposes by a large number of people of small or moderate means, and if the reported death rate from typhoid fever be correct, this would corroborate the statement of the city chemist just referred to, for if the water were actually bad 17 per cent. of the time, the typhoid death rate would doubtless be much higher. There has been a very marked improvement in the quality of the water supply since the opening of the sanitary canal in 1900. The purity of the water is affected by the amount of flow through the canal—the more flow, the better the water—and by the weather conditions. A strong east wind tends to contaminate the water though not nearly so much so as formerly. The most dangerous wind now is a south or southwest wind, which sometimes brings to the crib water polluted with the sewage from the Calumet and South Chicago districts, and this wind usually does not affect the water much further north than the Sixty-eighth street crib. Exhibits 7 (see H 60), 8 (see H 50), 9 and 10 (Exhibit 9 not reproduced) give further details in connection with the subject of sanitary condition of the supply and with the measures taken to warn the water consumers against unsafe water.

It would seem that the health department takes almost every reasonable precaution under the peculiar circumstances to give timely warning to water-takers. But from the nature of the case it is not always practicable to give timely warning. It is entirely possible, for instance, for the water at any pumping station to be safe at 8 A. M., and unsafe three or four hours later. The report to the effect that the water is safe would be in the hands of those who might read it at any time after 1 P. M. of that day. Under the conditions stated, the water would be unsafe at the very time that water-takers were reading a report to the effect that it was safe, and no contrary warning could reach them for twenty-four hours. Furthermore, no consumer likes to have to look in the paper for the health department notices before he can feel secure in drinking the water, and the consequence is that some persons take their chances and drink the water, while others buy water from other sources. To both of these classes of people, the notices are of little or no benefit, though they doubtless have value in educating the people generally as to the necessity for caution. In view of these facts and in view of the further fact that the city's health department reported that 17 per cent. of all the samples of city water analyzed by it in 1905 were "unsafe," the water should, in the opinion of the writer of this report, be classed as unreliable, and, therefore, not a good water for drinking purposes.

CHICAGO EXHIBIT 10.

The analysis is printed on a regular printed blank, with the sub-head, "Chemist's Daily Report to the Commissioner." "Samples collected March 5th, 1906. Analyses of samples from the designated sources of supply give the following: (Filtered in laboratory.)"

The blank contains in one corner, "Previous 24 hours

Wind movement ....Miles; .... Direction; .... Precipitation, ... in; Temp. ....°." Also a blank for the signature of the city chemist, also one for "Remarks." (All this portion of the blank is vacant.)

Determinations in parts of 100,000.

Number of Samples.	*Samples from (Stations at)*	*Free Ammonia.*	*Albuminoid Ammonia.*	*Oxygen Consumed.*	*Amount of Sediment.*	*Sanitary Quality.*
....	Fourteenth Street	.002	.006	.060	....	....
....	Chicago Avenue	.001	.006	.050	....	....
....	Hyde Park	.001	.006	.050	....	....
....	Lake View	.001	.006	.040	....	....
....	C. H. Harrison Crib	.001	.006	.050	....	....
....	Harrison Street	.002	.006	.060	....	....
....	Rogers Park	.001	.006	.050	....	....
....	Ashland Avenue	.001	.006	.050	....	....
....	Springfield Avenue	.001	.006	.050	....	....

The second analysis for the same day is headed "Unfiltered."

Number of Samples.	*Samples from*	*Free Ammonia.*	*Albuminoid Ammonia.*	*Oxygen Consumed.*	*Amount of Sediment.*	*Sanitary Quality.*
....	Fourteenth Street Station	.002	.009	.110	Slight.	Safe.
....	Chicago Avenue Station	.001	.009	.080	"	"
....	Hyde Park Station	.001	.009	.090	"	"
....	Lake View Station	.001	.008	.120	"	"
....	C. H. Harrison Crib	.001	.007	.110	"	"
....	Harrison Street Station	.002	.009	.110	Much.	"
....	Rogers Park Station	.001	.017	.200	Very much.	Unsafe.
....	Ashland Avenue Station	.001	.009	.080	Slight.	Safe.
....	Springfield Avenue Station	.001	.007	.110	"	"

REMARKS.—Rogers Park unsafe on account of large amount of sediment. Remainder of the blank, including place for signature, vacant.

Cleveland. In addition to the analyses made by Dr. Whipple, sanitary chemical analyses were made weekly, chemical analyses for chlorine daily, except Sundays and holidays; bacterial analyses daily except Sundays and holidays.

Syracuse. Chemical analyses of water from faucet in laboratory made once a month; bacteriological analyses of water from Woodland reservoir made twice a month from January to May, inclusive, and four times a month from June to December, inclusive.

Indianapolis. Daily.

New Haven. Every month regularly; additional special analyses were frequently made.

H 58. By whom were they made?

H 59. If the results of such analyses were made public, how and when?

Chicago. By the health department of the city of Chicago. The daily papers published the several results of the chemical analyses of water from each pumping station, describing the water as either "safe" or "unsafe." The health department also issues weekly bulletins and annual reports in which the quality of the water supply is discussed. (See H 57.)

Cleveland. Chemical analyses by Mr. William Pate, Jr., city chemist; bacterial analyses by Mr. H. O. Way, under supervision of Dr. W. T. Howard, Jr., city bacteriologist. The health department's chemical analyses were not made public. Dr. Whipple's report—extract from which (Exhibit 13) is reproduced in part, see H 55—accompanies water department report for 1905. Summary of health department's bacteriological analyses published in 1905 report.

Syracuse. Chemical analyses by city chemist Dr. F. E. Englehardt; bacteriological analyses by Dr. W. H. May, city bacteriologist. Results of these analyses were reported to health officer, Dr. F. W. Smith. They have not yet been published. (See H 55.)

Indianapolis. Analyses were made by Mr. H. E. Jordan, chemist and bacteriologist for the water company. A few analyses were also made by the city health department. The results were not published.

EXHIBIT 12

Indianapolis Board of Health,
Indianapolis, Ind.

Gentlemen:

Below are the results of an examination, both chemical and bacteriological, made on ten (10) samples of city water collected on February 23, 1906, at the places specified; sample number one was taken from the unfiltered water on the bed, and number two as it left the bed filtered; the remaining eight (8) samples were taken from fountains in different parts of the city. Negative results in dextrose broth and on agar plates show that no B. coli were found.

Source.	*Fermentation Dextrose Broth.*	*Agar Plates.*	*Bacteria in One C. C.*	*Chlorides Per Hundred Thousand.*	*Nitrites.*
1. Filter Influent	......	......	3,200	14.4	Trace.
2. Filter Effluent.	......	......	7	9.7	......
3. Delaware and South streets	......	......	29	8.0	......
4. Kentucky ave. and Church street	......	......	4	9.6	......
5. West and Washington streets	......	......	6	8.9	......
6. Prospect street and Fountain square	......	......	47	7.6	......
7. Prospect and State streets.	......	......	7	8.4	......
8. 17th and Northwestern ave.	......	......	33	6.8	......
9. 16th and Illinois streets..	......	......	34	7.6	......
10. Washington and Arsenal sts..	......	......	35	7.3	......

(Signed) **Fred W. Clarke,**
Chemist and Bacteriologist.

New Haven. By Professor Herbert E. Smith, Yale University. Not as a rule published.

H 60. Summarize results of such examination.

Chicago. Eighty-three per cent. of all the samples taken were pronounced "safe," 17 per cent. pronounced "unsafe." The yearly averages for each station ranged from 75 per cent "safe" at Twenty-second street station to 91 per cent. "safe" at Central Park avenue station.

Extract from Exhibit 7, page 121, the same being a discussion by Hugo Jone, city chemist, on the sanitary condition of the city water during the year 1905.

"Safe" waters are those which are found to contain substantially the same quantity of organic matter as midlake samples, and which, therefore, were free from pollution from the shore; "unsafe" waters are those which are found to contain more organic matter than the midlake samples, and which, therefore, were polluted by animal matter, from the shore, and prima facie, from the sanitary standpoint, are harmful.

Samples taken during the year 1905.	*Percent. of samples "safe."*	*Percent. of samples "unsafe."*
Fourteenth street station....	85	15
Chicago avenue station.....	80.8	19.2
Hyde Park station.........	83.6	16.4
Lake View station.........	77.8	22.2
Central Park avenue station.	91.4	8.6
Harrison street station.....	81.9	18.1
Rogers Park station........	83.4	16.6
Ashland avenue station.....	75.0	25.0
Springfield avenue station...	88.0	12.0
All stations...............	83.0	17.0

During the first six months of the year, the percentage of safe waters is a little lower than during the second six months, apparently on account of the annual spring pollution. See also H 30 and H 60.

Cleveland. Mr. Pate's weekly chemical analyses show considerable variations from time to time in constituents, indicative of sanitary quality of the water. Dr. Howard's bacteriological analyses show colon bacillus found in twelve out of a total of 300 samples of water examined.

EXHIBIT 14.

Extract from report of Dr. Martin Friedrich, health officer for 1905.

Typhoid Fever.

We lost 67 people from typhoid fever, or 15 in every hundred thousand. During the decade from 1893 to 1902, a yearly average of 38.9 per hundred thousand died from typhoid fever. During the epidemic of 1903 the figure rose to 111. In 1904 it was 47.4. In the registration area of the United States, the average death rate from typhoid fever was 25.4, so our death rate from this fever during 1905 was low, and for a large American city we did splendidly.

There are two reasons for this good showing: first, there was less typhoid fever throughout the country in 1905 than in the previous two years. The disease seems to have spent its force for a time, but the most important cause is our new water supply. Indeed, typhoid fever diminished very rapidly, and almost immediately after we began drawing water from the new intake crib.

Now, since our water supply is of so great importance, the question arises, "is our drinking water absolutely safe to drink?" Indeed, I am frequently asked this question. I have the water examined daily in our bacteriological laboratory, except on Sundays and holidays. Only twelve times during the year was the colon bacillus found. This is not much, but it points toward the possibility of contamination. Then the 67 deaths from typhoid fever indicate that we had at least 670 cases of the disease during the year. Some of them, I know, were caused by our milk supply. Some of them had just arrived here from other places; some of them may have been caused by eating raw oysters or vegetables, such as *celery or lettuce*, but a vast majority of these cases were contracted from our drinking water. Then we must not forget that European cities, partly by taking water from above human habitation, as Munich and Vienna, and partly by filtration, as Hamburg and Berlin, have brought the death rate from typhoid fever below 10. What other cities have accomplished we are in duty bound to reach. We cannot rest upon our laurels. We must further improve our water supply. For the present, I advise a speedy completion of the intercepting sewer.

Syracuse. Chemical analyses remarkably uniform; bacteriological analyses show very few bacteria of any sort, and colon bacillus has never been found in the city water, nor in the lake anywhere near the intake.

Indianapolis. (See H 61.) As indicated by the photographs (not reproduced here) the filter plant presents a very neat and attractive appearance. All of its appliances and accessories are strictly up to date, and the results obtained during 1905 after the filters had once been gotten into proper running order, were remarkably good, showing an average efficiency in the removal of bacteria of considerably over 99 per cent.

New Haven. Writer did not see all records; was informed that colon bacillus was sometimes found in all the waters, not excepting Lake Wintergreen, whose water is practically above suspicion, but that on all sheds, except Whitney, the colon was generally believed to come from animals, and therefore to be harmless.

H 61. How would you rate the purity of the water?

Chicago. Water supply is subject to rapid changes from "safe" to "unsafe," and it is not always possible to give warning of these changes. The purity of the water cannot be relied upon, and the water, therefore, cannot be classed as good from a sanitary standpoint. See also H 57, 58 and 59.

Cleveland. Water is almost always good, but is subject to pollution at rare intervals. Should, therefore, be classed as fair.

Syracuse. Water is not only good from a sanitary standpoint, but is also remarkably soft, and for a lake water unusually free from color. The water has at times had a slight taste and odor due to the growth of algae in the reservoir, but the presence of this growth does not affect the sanitary quality of the water, and has never given rise to any serious complaint. The quality of the water up to and including the year 1905 should in the writer's opinion be classed as excellent. It should be borne in mind, however, that the beauty of Skaneateles lake, and the growing tendency among those who have business in cities to establish residences for the summer, at least, in the country, are causing more and more people to build summer homes along the lake shore. Real estate companies have already acquired large tracts there, and are selling lots with fifty-foot frontage on the lake. The measures which have till now sufficed to safeguard the purity of the supply will not be adequate if the riparian population increases in accordance with the present indications. The city should now devise and carry into effect some more definite and comprehensive plan for forestalling the possibility of serious future pollution.

Indianapolis. The water supplied in 1905 was of good sanitary character. (See also H 158 D.)

New Haven. Water occasionally had slight color and taste from vegetable matters. From sanitary standpoint Lake Whitney water should be rated as fair during 1905. Waters from other four sheds, good.

H 62. What was the number of typhoid cases and deaths during the past year?

Chicago. Cases not reported. Deaths reported, 329.

Cleveland. Sixty-seven deaths, equal to 15.22 per hundred thousand of population. Estimated from 670 to 800 cases.

Syracuse. Cases reported, 147. Deaths, 18, equal to 15 deaths per hundred thousand of population.

Indianapolis. Four hundred and twelve cases, and 71 deaths.

EXHIBIT 13, mortality report to Walter Wyman, surgeon general of public health and marine hospital service. (Indianapolis, for year 1905.)

The total number of deaths from all causes, 3,080. Estimated population, 212,198. Death rate per thousand of the estimated population, 14.51.

Disease.	*Cases.*	*Deaths.*
Tuberculosis	...	370
Smallpox	8	1
Typhoid fever.......	412	71
Measles	50	1
Scarlet fever........	394	9
Diphtheria	172	20
Whooping cough.....	...	13

New Haven. Two hundred and forty-seven cases reported, and 49 deaths.

CONSUMPTION

Chicago.

H 63. Total number of services. About 255,000. Bills rendered to about 235,000. See also H 151.

H 64. Total number of services metered, 10,559

EXHIBIT 13, Table number XIV. Meter mechanical division, showing water meters in use and how distributed, December 31, 1905.

Stores and flats........................	1,618
Business houses........................	1,178
Residences and apartment buildings....	3,052
Railroads	698
Manufactories	1,811
Breweries	160
Liveries	419
Packing houses........................	151
Laundries	262
Hotels	300
Office buildings.......................	201
Theatres	35
Miscellaneous	371
Charitable institutions................	105
	10,558

H 65. Percentage of total number metered. 2.97.

H 66. Total annual amounts sold by meter to all consumers. 24,088,827,500 gallons. Impossible to separate the domestic, manufacturing and commercial as per questions H 66 and H 67.

H 67. Total amount sold unmetered to private consumers.

H 68. Total annual amount consumed by municipality. No records.

H 69. Total annual amount supplied free. No records.

H 70. Total annual amount unaccounted for. No records.

H 71. Total annual amount supplied. 135,588,942,536 gallons.

H 72. Estimated population January 1, 1906, actually taking water from mains. 1,800,000.

H 73. Average daily consumption per capita upon basis of inquiry H 72. 206.4 gallons.

H 74. Population at last national census of area supplied. Total population 1900 census, 1,698,575; assuming 90 per cent. supplied, 1,530,000.

H 75. Average daily consumption per capita upon the basis of Inquiry H 74, 211.8 gallons. It is impossible to separate the domestic from the manufacturing and commercial.

H 76. Average daily consumption per family upon the basis of last national census. Assuming five to family, 1059 gallons.

H 77. Total maximum daily consumption during past year.

431,108,500 gallons, estimated from 1904, allowing for growth and for slip.

H 78. Total minimum daily consumption during past year.

316,581,000 gallons, estimated from 1904, allowing for growth and for slip.

H 79. May any consumer who desires have a meter?

No, the classes of services which must be metered are fixed by ordinance passed in July, 1905.

H 80. May any consumer be forced to have a meter?

All whose flat rate assessments exceed a certain amount per annum, and all manufacturing establishments and certain other classes of consumers may be forced to have meters. Under ordinances in force up to July 5, 1905, all manufacturing establishments and certain other classes of consumers could be compelled to have meters, also all consumers whose flat rate assessments amounted to $75 or more per annum. After July, 1905, the number of those who could be compelled to have meters was increased by including all whose flat rate assessment amounted to $50 or more per annum, and by ordinance passed January 29, 1906, the number was still further increased by including all those having a flat rate assessment of $25 or more.

H 81. Are consumers' meters removed and tested at regular intervals? At regular intervals, no; whenever deemed necessary, yes.

H 82. If he believes that the meter is fast, how may he have it tested? On request, and at city's expense.

H 83. Are there records of proofs of meters as removed? If so, show them. Yes. The sample attached is not entirely legible. It is on a mimeograph form and signed by H. O. Nourse, department representative (superintendent), D. F. Foley, manufacturer's representative, and T. Coulin meter tester. The meter was number 9,281, Worthington make, plunger C 3, size ⅝-inch; old.

H 89 (a). Total number of hydrants in use at the end of year

20,500. The count of hydrants from the maps showed a total of 19,816. An estimate recently made by the city by sending out inspectors to count the existing hydrants in each district gave a total of 20,368. The annual reports showed 20,794. For purposes of appraisal, the total was placed at 20,500. The work of measuring the lengths of mains from the maps and the counting of valves and hydrants involved the recording and footing of over 40,000 items.

H 89 (b). Total number of hydrants in use at end of year per hundred acres of area supplied.

15.5. In calculating the area supplied, isolated pipes were supposed to supply a strip 200 feet wide on each side of pipe.

Cleveland.

H 63. Total number of services. 79,401. Of these 65,756 were in use in 1905.

H 64. Total number of services metered. 44,086. Total meters including elevator counters, 44,796.

Sometimes one meter covers more than one service connection.

(a) Domestic, about 41,725.

(b) Manufacturing and commercial, about 2,791.

Free services to city parks, buildings, etc., 427.

By far the most notable act of the present administration of the water works division, and the one which has been most widely and variously criticised has been the rapid and compulsory universal installation of meters, now nearly finished. No account of the Cleveland plant would be complete without some reference to the effects of the meters and of the new rates.

The installation of meters called forth from press and public violent criticisms of the water works management. This criticism was often silly and ill founded. For example, the meters were by many persons held responsible for the typhoid in 1903 and 1904, which might have been much more properly charged to delay in completing the tunnel, pumping station, and intercepting sewers. Both press and public now understand some features of the situation better, however, and the meters are not only tolerated, but are even sought after by consumers, who know that their rates will be reduced thereby. While the water works management deserves credit for its perseverance in the setting of meters, it is the writer's opinion that the present meter rates given in Exhibit XVII not only cause unjust discrimination, but are also unwise from the standpoint of good financial management. That the flat meter rate causes unjust discrimination may be shown as follows:

It must be admitted that in fairness to all the amount which each consumer pays for water service should be based as nearly as possible on the cost of the service rendered. No consumer should be taxed in excess of this cost, in order that another consumer may be supplied at a loss. In Cleveland, a consumer having a ⅝-inch meter, may draw a daily average of 128 gallons of water for his minimum rate of $2.50 per annum, and a large number of them actually keep within this minimum. The average cost of a ⅝-inch meter and its setting is $17.65. The cost for reading and testing the meter, clerical expense, and interest, depreciation and maintenance is not less than $3.40 per annum for each ⅝-inch meter. The result to the department from the setting of a thousand such meters may be stated as follows:

Investment in a thousand meters	$17,650
Annual revenue from a thousand meters	2,500
Annual cost of operating and maintaining thousand meters, at $3.40	3,400

Making a net loss on a thousand consumers of $900 per year, without allowing anything for cost of pumping, or for any of the other operating expenses, or fixed charges on all the rest of the plant.

The meter expenses incident to supplying to one large consumer $2,500 worth of water, or 128,000 gallons per day, for the year may be estimated as follows:

Cost of one 3-inch meter and setting	$118.60
Reading, testing, clerical expense, interest, depreciation and maintenance	16.00

The results to the department would be as follows:

Investment in meters and setting	$118.60
Annual revenue	2,500.00
Meter expenses	16.00
Profit to water department	2,484.00

not allowing for any expenses other than those incident to the water service.

From the foregoing, it is evident that the profits on the large consumers go to make up the losses on the small ones, which constitutes an unjust discrimination against the former, and in favor of the latter.

That the rates are unwise, from the standpoint of good business management, is evident from the consideration of the following facts: The principal end sought by the installation of meters was the reduction of the daily pumpage, which means naturally not only reduction in pumping expenses, but also a decrease in cost of extensions to plant. The annual reports of the superintendent of water works for 1903, 1904 and 1905 have set forth very fully the savings effected by the introduction of meters, but the other side of the question has not been clearly stated. In 1901, there were 2,981 meters, and the daily per capita consumption, not allowing for slip of pumps, was about 172 gallons. By the end of 1905, 68.4 per cent. of all active services were metered, and the average per capita consumption for the year, not allowing for slip, was about 132 gallons. This reduction of 40 gallons was practically all due to the meters. Some credit should be given to improved methods of detecting and preventing leakage and waste, and some to seasonal differences in the two years compared; but these would probably have been offset by the yearly increase which was taking place in the per capita consumption, so that it is fair to credit the meters with the whole saving of 40 gallons per capita per day. But had the meter rates been a sliding scale rate, instead of a low flat meter rate, that is, had the rate per thousand gallons for the first few hundred gallons used per day been higher than 5 1/2 cents, decreasing to slightly less than that amount where very large quantities were used, a much greater inducement would have been offered to small consumers to economize in their use and waste of water. With the rates as they are at present, many small consumers can get more water than they need, without exceeding their minimum rates of $2.50 to $5 per annum, and they, therefore, have no incentive to stop waste. Had the sliding scale of meter rates been in effect, the daily per capita consumption would have undoubtedly been reduced much more than forty gallons, so that the efficiency of the meter in reducing waste and leakage and all of the other expenses consequent thereon, has been much impaired by the rates in force. The superintendent of the water works division, in his report for 1905, estimates that the consumers who formerly paid assessment rates, paid by meter in 1905 $118,810 less in the aggregate than they had formerly paid, which is doubtless correct, but it is interesting to compare these figures with the diminution in the net receipts of the water department.

Diagram A on plate XXXVII (not reproduced here), constructed per figures given on page 20 of the superintendent's report, shows graphically what the difference between earnings and expenses, as based on these figures, actually was in each year from 1900 to 1905 inclusive, and also what this difference would probably have been had meters not been introduced. In round numbers, the loss of net earnings caused by the meters, based on the figures above referred to, was about $228,000 for 1905, but the figures from which diagram A was platted include in the earnings the interest on deposits in bank (with which the meters cannot be said to have had anything to do), and leave out the expenditures for repairs, which were to some extent affected by the meters.

Diagram B, same plate (not reproduced here), shows the effect of the meters if the interest be left out, and the repairs be taken into consideration. The decrease in net earnings as shown on Diagram B was for 1905, about $316,000. As only part of the increase in repairs can properly be charged to the meters, it would be fair to say that the actual decrease in net earnings for the year 1905 due to the introduction of meters was somewhere between the two amounts named, and averaging the two for a rough estimate will bring the loss of net earnings caused by the meters to about $272,000 for the second year of their use. This would capitalize at 4 per cent. for interest the sum of $6,800,000; or, allowing 7 per cent. for interest and depreciation, $272,000 would capitalize $3,885,000. The meters themselves have already cost with their setting about $780,000, which amount will be increased to about $1,150,000 by the time all services are metered; nor is this all, for the lines in both the diagrams on Plate XXXVII are diverging, so that with each succeeding year the decrease of net earnings will increase. It would seem from the foregoing that if some of the consumers have profited in 1905 to the extent of $118,810 in reduced rates, while the net earnings of the department have diminished by $272,000, the net result must be an actual loss to the consumers who own the plant and who must in the long run pay its loss or enjoy its profits. The writer does not wish to be understood as stating that the introduction of meters was an error, or that all of its far-reaching results are summed up in the diagrams on Plate XXXVII. On the contrary, he believes that conditions in Cleveland had reached a point where the introduction of meters was a matter of vital necessity. He simply wishes to point out that while meters have accomplished much in Cleveland, they have not accomplished nearly so much as would have been the case had their installation been accompanied by rates fixed on a reasonable, businesslike and equitable basis. See also H 43.

H 65. Percentage of total number metered. 68.4 per cent. of total number of services in use. (a) Domestic, 66.7 per cent. (b) Manufacturing, practically 100 per cent.

H 66. Total annual amount sold by meter to private consumers. 10,149,787,500 gallons. (a) Domestic, ——. (b) Manufacturing and commercial, ——.

H 67. Total amount sold unmetered to private consumers.

The total annual amount supplied in 1905 was 21,041,712,000 gallons (see H 71). Of this amount, 10,149,787,500 gallons were sold by meter to private consumers (see H 66); 750,000,000 gallons were consumed by the municipality (see H 68); and 204,000,000 gallons were supplied free (see H 69); making a total of 11,103,787,500 gallons. Subtracting this amount from the total amount supplied, leaves 9,937,924,500 gallons, which includes the water sold unmetered to private consumers (H 67), as well as the water unaccounted for (H 70). There is no way in which the last two quantities can be accurately separated, but it may be safely assumed that by far the larger part of the total of 9,937,924,500 gallons was sold unmetered to private consumers; thus coming under the head of this question (H 67).

(a) Domestic, ——

(b) Manufacturing and commercial. Practically none.

H 68. Total annual amount consumed by municipality.

Estimated, 750,000,000 gallons.

H 69. Total annual amount supplied free.

Estimated, 204,000,000 gallons.

H 70. Total annual amount unaccounted for.

There are no means of accurately estimating the amount of water unaccounted for, but it is safe to assume that it constitutes only a very small proportion of the 9,937,924,500 gallons referred to in answer to H 67.

H 71. Total annual amount supplied.

Allowing for slip, 21,041,712,000 gallons.

H 72. Estimated population January 1, 1908, actually taking water from mains.

Population of city	442,314
Of suburbs using Cleveland city water	19,754
Total	462,068

Estimating that 99 per cent. of these take city water, the number actually taking city water would be 457,447.

H 73. Average daily consumption per capita upon basis of inquiry H 72.

Allowing for slip, 126 gallons.

H 74. Population at last national census of area supplied.

In 1900 the population of Cleveland alone was 381,687; that of the suburbs then using city water was 24,819, making a total population of the area then supplied 406,506.

H 75. Average daily consumption per capita upon basis of Inquiry H 74.

Based on consumption in 1900, 154 gallons, allowing for slip.

(a) Domestic, (b) manufacturing and commercial, cannot separate.

H 76. Average daily consumption per family upon basis of last national census. 770 gallons, allowing for slip.

H 77. Total maximum daily consumption during past year.

February 15, 88,900,000 gallons, allowing for slip.

H 78. Total minimum daily consumption during past year.

November 12, 42,380,000 gallons, allowing for slip.

H 79. May any consumer who desires have a meter?

Yes. Section 299 of ordinances, rules and regulations for the management and protection of the Cleveland, Ohio, city water works, adopted December 31, 1896 (Exhibit 16): "At the discretion of the director of the department of public works any or all water connections, both business and residence, shall be metered at the cost of the water department." The same section fixes rates, which "shall be uniform." This was amended by ordinance passed April 11, 1904, declaring that at the expense of the department, water for nearly all business premises—many kinds being designated by name—shall be metered, but that residences shall be metered only at the desire of the consumer, except "that in case of waste or other improper or unauthorized use of water, of which satisfactory proof has been furnished to the water department, meter may be set without the consent of the consumer." The rates still remain uniform, at the old price, namely, four mills per cubic foot, equal to 5 1/3 cents per thousand gallons. Minimum rates $\frac{5}{8}$-inch meter, $1.25, each semi-annual collection, or $2.50 per annum for $\frac{5}{8}$-inch meter.

H 80. May any consumer be forced to have a meter?

Yes. See H 79.

H 81. Are consumers' meters removed and tested at regular intervals?

Not at regular intervals, but it is a rule of the department to remove and test a meter when it has registered a certain amount, varying with size of meter. Rule not strictly adhered to in past on account of lack of men.

H 82. If he believes that the meter is fast, how may he have it tested?

Any consumer may on depositing $1 have his meter tested. If meter has not over-registered, the city keeps the dollar. If meter has over-registered, the city returns the dollar and makes proper rebate in his bill.

H 83. Are there records of proofs of meters as removed? If so, show them.

Yes. (Samples attached to original report. Exhibit 2.)

H 83a. Total number of hydrants in use at end of year. About 7,642. Of these, 21 are 3-inch; 7,014 are 4-inch; and 607 are 6-inch. See also H 22.

H 83b. Total number of hydrants in use at end of year per 100 acres of area supplied, 41.2. Total area supplied in Cleveland and in such suburbs as are served by the 7,642 hydrants equals 18,546 acres. In calculating area supplied, isolated mains are supposed to supply a strip 200 feet wide on each side of the main.

Syracuse.

H 63. Total number of services. Connected to premises, 19,712. Of these, 553 are turned off. There are also 2,629 services laid to curb only, which are not included in above.

H 64. Total number of services metered, 15,833, of which 66 are public services.

(a) Domestic, 13,865. (b) Manufacturing and commercial, 1,902. (c) Public, 66.

H 65. Percentage of total number metered.

Counting active services only, 83.64. Estimated total domestic services, 19,712, minus 552 minus 66 minus 195 minus 1,902 equals 16,936. (a) Domestic, 13,865 divided by 16,936 equals 81.88 per cent. (b) Manufacturing and commercial, 100 per cent. (c) Public, 66 divided by 195 plus 66 equals 25.29 per cent.

H 66. Total annual amount sold by meter to private consumers. 2,263,000,000 gallons.

(a) Domestic, 620,500,000 gallons (Estimated).

(b) Manufacturing and commercial, 1,642,500,000 gallons (Estimated).

H 67. Total amount sold unmetered to private consumers and unaccounted for (H 70). 1,574,750,000 gallons.

(a) Domestic and unaccounted for, 1,574,750,000 gallons.

(b) Manufacturing and commercial. None.

H 68. Total annual amount consumed by municipality. 670,000,000 gallons.

H 69. Total annual amount supplied free. No free water other than that included in answer to H 68.

H 70. Total annual amount unaccounted for. Cannot separate. See H 67.

H 71. Total annual amount supplied. 4,507,750,000 gallons.

H 72. Estimated population January 1, 1906, actually taking water from mains. Total population, 120,000. Estimated that 95 per cent. take water from mains, 114,000.

H 73. Average daily consumption per capita upon basis of Inquiry H 72. 108.3 gallons.

H 74. Population at last national census of area supplied. 108,274.

H 75. Average daily consumption per capita upon basis of Inquiry H 74. Based on consumption in 1900, 10,993,000 divided by 108,274 equals 101½ gallons.

H 76. Average daily consumption per family upon basis of last national census. Estimated five persons to one family, 507½ gallons.

H 77. Total maximum daily consumption during last year. Estimated, 15,854,000 gallons.

H 78. Total minimum daily consumption during past year. Estimated, 5,077,000 gallons.

H 79. May any consumer who desires have a meter?

Yes. Consumer pays cost of meter. If the meter be larger than ⅝-inch consumer also pays the department the cost of setting it. Department sets ⅝-inch meters without charge for setting.

H 80. May any consumer be forced to have a meter?

Yes, at the discretion of the commissioner of public works. In May, 1905, the commissioner made a rule that all existing services except those furnishing faucet use alone, should be metered. Also all existing services through which water was supplied for other than family uses. A rule was already, and still is, in force, stipulating that no permit will be issued for a new service of any nature or for any alteration of any existing unmetered service unless the application for such permit be accompanied by an order for the installation of a meter.

In all cases the consumer pays for the meter as well as for its repairs and maintenance. See rate sheet, Exhibit 8 (not reproduced here).

H 81. Are consumers' meters removed and tested at regular intervals?

No; meters in use are not tested unless there is some reason to suspect their inaccuracy.

H 82. If he believes that the meter is fast, how may he have it tested?

Upon application to department.

H 83. Are there records of proofs of meters as removed? If so, show them.

Meters in use are not often tested, and there are no available records of tests of this class. Meters are, however, tested before they are set.

H 83a. Total number of hydrants in use at end of year. 2,809.

H 83b. Total number of hydrants in use at end of year per 100 acres of area supplied.

10,498 acres divided by 100 equals 104.98. 2,809 divided by 104.98 equals 26.76.

In calculating area supplied, isolated mains are supposed to supply a strip 200 feet wide on each side of main.

Indianapolis.

H 63. Total number of services, 22,748; domestic, 14,494; manufacturing or commercial, 2,069; city connections, 347; idle, 5,838; total active services, 16,910.

Under date of December 31, 1905, Mr. Frank C. Jordan, of the company, writes (Exhibit 5): "We have at this date 22,748 attachments. Of these attachments, 284 are supplying factories, 1,785 are supplying various commercial places, 14,494 are supplying domestic consumers, 347 are supplying various city connections, and 5,838 are off.

The item "commercial places" includes all stores, both retail and wholesale; all saloons, office buildings, livery barns, butcher shops, barber shops, etc. The item "domestic consumption" includes all private dwellings, flats, churches, etc. The item "off" includes all connections for vacant houses, commercial places, facturies, etc., also all services to vacant lots. The item of 247 connections for the city includes the connections for the parks, fountains, sewer flushing tanks, street sprinkling connections, etc."

H 64. Total number of services metered, 1,422. (a) Domestic, 321. (b) Manufacturing and commercial, 1,101.

H 65. Percentage of total number metered, 6.25 per cent. Percentage of total active metered, 8.04 per cent. (a) Domestic, of total active domestic services, 2.22 per cent. (b) Manufacturing, of total active manufacturing and commercial services, 53.21 per cent.

H 66. Total annual amount sold by meter to private consumers, 1,720,280,040 gallons. (a) Domestic, 683,085,000 gallons. (b) Manufacturing and commercial, 1,037,195,040 gallons.

H 67. Total amount sold unmetered to private consumers, 3,048,-073,441 gallons. (a) Domestic, —— (b) Manufacturing and commercial, ——

H 68. Total annual amount consumed by municipality, 1,373,-398,285 gallons.

EXHIBIT 6.

(H 66 to H 71, Inclusive.)

Total amount of water consumed by municipality for public purposes, such as street flushing and sprinkling, parks, fountains, hospitals, fire houses, market houses, etc.

	Gallons Daily.
Tomlinson hall	17,000
City police station	18,250
City hospital	60,000
Engine houses, 25, each averaging 35,000 per month	29,166
South Side market house	1,666
Detention hospital	1,000
Haughville building	1,000
Flower mission building	2,000
Flush tanks, 63, each running 200,000 per month	420,000

CITY PARKS.

Garfield, 4-inch line	23,000
University, 3-inch line	23,000
Military, two 4-inch lines, etc.	70,000
Brookside, 3-inch line	10,000
Riverside, four 2-inch lines	83,000
St. Clair, 2-inch line and fountain	10,000
Kirlin, 2-inch line	16,000
Highland, 1½-inch line	14,000
Spades, two 2-inch lines	8,000

MORTON PLACE SPRINKLERS.

In Delaware street	6	
In Alabama street	6	
In New Jersey street	6	
	18	4,000
Fletcher avenue, 8 sprinklers, ¾-inch		2,000
Highland Place, 4 sprinklers, ¾-inch		1,000
Orisbie street, 2 sprinklers ¾-inch		1,000
East Eleventh street, 6 sprinklers, ¾-inch, and 1 fountain		5,000
Ft. Wayne and St. Clair sprinkler, 1 sprinkler		
Flower mission grounds		5,000
Birch and Warren sprinkler		500
Fall Creek boulevard		
Irvington fountain		1,500
Hendricks place, three ¾-inch sprinklers		1,000
Flushing improved streets		600,000
Flushing sewers		600,000
Sprinkling unimproved streets		166,667
57 drinking fountains		1,500,000
		3,625,747

Total annual amount consumed by municipality, not including water used for extinguishing fires	1,323,398,385	gallons.
Annual amount used to extinguish fires, estimated by D. H. Maury	20,000,000	"
(H 68) Total annual amount consumed	1,343,398,385	"
(H 69) Total annual amount supplied free to private consumers	6,570,000	"
(H 66) Total annual amount sold by meter to private consumers	1,726,280,040	"
(H 66, 68, 69) Total	3,076,248,425	"
(H 71) Total annual amount supplied	6,124,321,866	"
(H 67) Total annual amount sold unmetered to private consumers (H 71) (H 66, 68, 69)	3,048,073,441	"

(H 70) It is impossible to make an accurate estimate either of the water sold unmetered to private consumers (H 67), or of water unaccounted for (H 70). The sum of the two may, however, be found as above by subtracting all other known amounts from the total annual water supplied. Water unaccounted for would include leakage and water that is stolen. As it is certain that the sum of these two losses would be very small as compared with the total amount sold unmetered to private consumers, the whole amount has been credited to the latter (H 67).

H 69. Total annual amount supplied *free* to private consumers, 6,570,000 gallons.

H 70. Total annual amount unaccounted for, ———.

H 71. Total annual amount supplied, 6,124,321,266 gallons.

H 72. Estimated population January 1, 1906, actually taking water from mains, 120,000.

(Estimated population of Indianapolis January 1, 1906, 226,000.)

H 73. Average daily consumption per capita upon basis of Inquiry H 72, 139.8 gallons.

(Average daily consumption per capita of total population, 79 gallons.)

H 74. Population at last national census of area supplied. About 152,000.

H 75. Average daily consumption per capita upon basis of Inquiry H 74. 77 gallons.

Total population of city of Indianapolis by national census of 1900 was 169,164, and the then average daily consumption per capita of total population was about 70 gallons. The population actually taking water from mains in 1900 was about 96,000, and the average daily per capita consumption based on this population was about 122 gallons.

(a) Domestic ——.

(b) Manufacturing ——.

H 76. Average daily consumption per family upon basis of last national census.

Estimating five to family, based on total population, 350 gallons; on population within reach of mains, 385 gallons; on population actually taking water from mains, 610 gallons.

H 77. Total maximum daily consumption during past year.

Domestic and fire combined, 28,290,658 gallons, on February 20. Domestic alone, 21,280,296 gallons, on February 15. Allowance made for estimated slip.

H 78. Total minimum daily consumption during past year, 10,643,365 gallons, on May 5. Allowance being made for estimated slip.

H 79. May any consumer who desires have a meter?

Yes; meters furnished and maintained by company without cost to consumer.

H 80. May any consumer be forced to have a meter? Yes.

H 81. Are consumers' meters removed and tested at regular intervals?

Not at regular intervals, but from time to time as desired by company or consumer.

H 82. If he believes that the meter is fast, how may he have it tested?

Consumer may have meter tested by company or by any competent disinterested party. Expense borne by consumer if meter is not fast, otherwise by company, which also rebates for proven error in meter.

H 83. Are there records of proofs of meters as removed? If so, show them.

Few records preserved, and these in such form that original could not well be obtained.

H 83a. Total number of hydrants in use at end of year. 2,201.

H 83b. Total number of hydrants in use at end of year per 100 acres of area supplied. 24.

In calculating the area supplied, isolated pipes were supposed to supply a strip 200 feet wide on each side of pipe.

EXHIBIT 7.

(H 83a and H 83b.)

Under date of March 13, 1906, Mr. William Curtis Mabee, construction engineer, Indianapolis water company, makes the following statement:

2,201 hydrants in entire distribution system.
Area protected by 2,201 hydrants = 9,190 acres.
Area protected by 2,201 hydrants = 14.36 square miles.
Area protected by 2,201 hydrants = 20,008 feet square.
Area protected by 2,201 hydrants = 3.79 miles square.
Area protected by each hydrant = 4.18 acres.
Area protected by each hydrant = 181,881 square feet.
Area protected by each hydrant = 426.47 feet square.

In estimating area protected along isolated pipe lines a strip is taken 400 feet wide.

New Haven.

H 63. Total number of services, 17,200.

H 64. Total number of services meteréd, 650.
- (a) Domestic, 250.
- (b) Manufacturing and commercial, 400.

H 65. Percentage of total number metered, 3.8 per cent.
- (a) Domestic, ——.
- (b) Manufacturing, ——.

H 66. Total annual amount sold by meter to private consumers. 1,909,032,000 gallons.
- (a) Domestic, ——.
- (b) Manufacturing and commercial, ——.

H 67. Total amount sold unmetered to private consumers 5,031,209,000 gallons.

The total amount supplied in 1905 was 7,908,941,000 gallons (see H 71). Of this amount, 1,909,002,000 gallons were sold by meter to private consumers (see H 66). 968,000,000 gallons were furnished free to the municipality, or to the various schools and charitable institutions in accordance with city ordinance (see H 68). 700,000 gallons were supplied free to private consumers, for directors and officers of the company (see H 69), making a total of 2,877,702,000 gallons. Subtracting this amount from the total amount supplied leaves 5,031,209,000 gallons, which includes the water sold unmetered to private consumers (H 67), as well as the water unaccounted for (H 70). There is no way in which the last two amounts can be accurately separated, but it may be safely assumed that by far the larger part of the total of 5,031,209,000 gallons was sold unmetered to private consumers, thus coming under the head of this question (H 67).

(a) Domestic, ——.

(b) Manufacturing, ——.

H 68. Total annual amount consumed by municipality. 968,000,000 gallons, including all free water to schools, charitable institutions, etc., as required by ordinance.

H 69. Total annual amount supplied free. About 700,000 gallons.

Only water supplied free to private consumers is supplied to directors, secretary and superintendent of company.

H 70. Total annual amount unaccounted for.

There are no means of accurately estimating the amount of water unaccounted for, but it is safe to assume that it constituted only a very small proportion of the 5,031,209,000 gallons referred to in answer to H 67.

H 71. Total annual amount supplied, 7,908,941,000 gallons.

H 72. Estimated population January 1, 1906, actually taking water from mains, 120,000.

H 73. Average daily consumption per capita upon basis of Inquiry H 72, 180½ gallons.

H 74. Population at last national census of area supplied, 108,000.

H 75. Average daily consumption per capita upon basis of Inquiry H 74. Estimated, 175 gallons.

(a) Domestic, ——.

(b) Manufacturing and commercial, ——.

H 76. Average daily consumption per family upon basis of last national census. Estimating five persons to a family, 875 gallons.

H 77. Total maximum daily consumption during past year. Estimated, 27,000,000 gallons.

H 78. Total minimum daily consumption during past year. Estimated, 18,000,000 gallons.

H 79. May any consumer who desires have a meter?

Yes. Application for metered service attached hereto (Exhibit 10), and contract between city and company, attached to original report as Exhibit 3 (not reproduced here).

EXHIBIT 10. (H 79.)

APPPLICATION FOR METERED SERVICE.

New Haven, ..., 190 .

New Haven Water Company.

Gentlemen:

I own or control the premises ....

and desire water upon the measured service for ....

If this application is accepted by the company, I agree that I will:

(1) Pay for all water, whether used or wasted, at the regular meter rates for the quantity used, as indicated by the register, within ten days from date of bill rendered.

(2) Pay a minimum rate for water of $2.00 per quarter whether water to this value is used or not.

(3) Keep the measured service for at least one year.

(4) Allow no connections to be made between street main and meter.

(5) Pay for the setting of the meter, and a yearly rental to the company of $1 for a ⅝ meter; other sizes in proportion.

(6) Pay for all damage to meter from frost, hot water, or accidents from causes I can control.

(7) Allow access to the premises and meter at any reasonable time by the inspectors of the company.

(8) Give prompt notice to the company in case of necessary repairs to the service inside of the meter, and allow no one to meddle with it.

(9) Pay for the water upon a pro rata basis estimated upon the last reading for a corresponding period in case the meter fails to register.

(10) Comply with all the regulations of the company.

Yours very truly,

....

H 80. May any consumer be forced to have a meter?

In case rate cannot be agreed upon or for waste, yes.

(Extract from contract between the city of New Haven and the New Haven water company, signed February 17, 1902, p. 7: "Any consumer may, subject to the regulations of the company, be put upon a metered service if he shall so desire.")

H 81. Are consumers' meters removed and tested at regular intervals?

Not at regular intervals, but whenever deemed necessary by consumer or by company.

H 82. If he believes that the meter is fast, how may he have it tested?

Upon application to the company, which will then test it for him.

H 83. Are there records of proofs of meters as removed? If so, show them.

No permanent records of meter tests preserved. Records of all meters are kept whether they are in service or not.

H 83a. Total number of hydrants in use at end of year, 992.

H 83b. Total number of hydrants in use at end of year per hundred acres of area supplied, 15.27.

In calculating area supplied, isolated mains are supposed to supply a strip 200 feet wide on each side of the main.

PRESSURE.

H 84. State how pressure was measured and recorded.

Chicago. Non-recording pressure gauges on all pumps, and recording gauges at each pumping station. Hydrant pressures were measured only when rendered necessary by complaint or for other reasons.

Cleveland. Pressure gauges on each engine at each pumping station, and recording gauges on force mains, there being two recording gauges at Kirtland street, two at Division street and one at Fairmount. There are pressure gauges at 26 fire engine houses in different parts of the city. All pressure gauges are read every hour, and reports sent to water office weekly.

Location and elevations of these gauges are shown, Plate III. (Not reproduced here.)

Syracuse. Recording gauges at water works office, corner North State and James streets, and at water works repair shop, corner North State and Canal streets. Should occasion arise, or complaint be made of lack of pressure, a man is sent out with a gauge to test pressure at hydrant.

Indianapolis. There were non-recording pressure gauges on all pumps and at company's office. Also recording pressure gauges at pumping stations. On March 3, 1905, a recording gauge was set at headquarters of fire department, and during the following week recording gauges were set at each fire engine house. On May 5 recording gauge was set at company's office.

New Haven. Fire department has recording gauges at three engine houses. Company has gauges at superintendent's office, at the pumping station, and in a vault at corner of Prospect street and Hillside place.

H 85. Summarize records for past year.

Chicago. Average pressure on discharge mains for all pumping stations, except Washington Heights, reported at 38.51 lbs. Washington Heights, 64.05 lbs. No allowance made for air columns in gauge pipes. (See H 16 and H 16b.)

EXHIBIT 5.

(H 85, Chicago.)

Extract from report on the city of Chicago, Illinois, issued by the National Board of Underwriters, Committee of Twenty, December, 1905.

P 16. Table No. 7. Pressures at pumping stations during the year 1903.

Station	*Elevation of Recording Gauge.*	*Gauge Reading, Pounds Per Square Inch.* *Average.*	*Daily Range.*	*Minimum Reading.*
North	601	36	33-38	29
West	604	30½	28-32	23½
Harrison street	603	30½	28-32	24
Fourteenth street	606	35	29-33	25½
Lake View	595	36½	34-38	31
Sixty-eighth street	592	42½	39-45	36
Springfield avenue	611	25½	25-30	17
Central Park avenue	608	27½	24-30	20½
Washington Heights	623	63	60-66	..
Norwood Park	651	30[1]	.....	..

Minimum daily pressure occurs between the hours of 8 a. m. and 2 p. m.; minimum rating for the year occurs at times when one or more engines are shut down for repairs. During periods of excessive consumption in very cold or very warm weather—in June and July, 1905—pressure observations at hydrants scattered throughout the city were made by National Board engineers during the hours of largest consumption, 9 a. m. to 5 p. m. Results are shown in Table No. 8.

TABLE NO. 8. PRESSURES AT HYDRANTS.

District.	*Pressure Per Square Inch with Hydrant Outlets Closed.* *Average.*	*Maximum.*	*Minimum.*	*Number of Readings.*
Main service	22	39	3	2,019
Washington Heights	53	61	35	34
Norwood Park	44	45	41	6
Rogers Park[2]	50	57	39	51
Congested value	26	32	18	44

* * * The relative portions of the city served under pressures of different magnitude are given in Table No. 9.

---

[1] Pressure at Norwood Park is ordinarily kept at about 30 pounds by a regulating valve, and in case of fire may be increased to 45 pounds.

[2] Supplied by Rogers Park Water Company.

TABLE NO. 9. DISTRIBUTION OF PRESSURE IN MAIN SERVICE.

Pressure.	Area served, sq. miles.	Per cent.
Below 10 lbs.	5	5
10-15 lbs.	9.6	9
15-20 lbs.	15.4	14
20-25 lbs.	53.6	51
25-30 lbs.	21	20
Over 30 lbs.	1	1
Total	105.6	100

Ibid. P. 19 (*Pressure at Hydrants*).

TESTS—HYDRANTS SELECTED FOR TESTS.

Tests of 593 hydrants in well-scattered groups were made by National Board engineers in July and August, 1905. Groups were arranged to embrace six hydrants which would naturally be used in case of fire in the localities in question. In selecting hydrants for tests consideration was given to the importance of the occupancy and to the size and arrangement of the mains. Some of the groups were selected with the intention of developing a suspected weakness in the distributing pipe system; others, in following out the consideration just cited, were selected at the stronger places on the mains. Thus the tests embrace hydrants on mains of all sizes from 36 inches down to 4 inches in diameter. The different types of hydrants in use were recognized by being included in the tests in about the same proportion that they bear to the whole installation. Hence the combined tests are fairly representative of average conditions regarding the fire engine supply available from hydrants.

* * * A test of two groups of six hydrants each in the Washington Heights section gave an average discharge per hydrant of 300 gallons per minute, some of the hydrants under the conditions of the test yielding less than 200 gallons per minute. Three groups of three hydrants each, tested in the Norwood Park section gave an average discharge per hydrant of 250 gallons per minute, a quantity sufficient for only one good fire stream. One group in this section on 4-inch and 6-inch mains yielded only 100 gallons per minute per hydrant.

METHOD OF TESTING.

Hydrants were tested by means of specially designed apparatus, which measures directly the velocity of the jet flowing from the outlet. Excepting in some of the outlying residence sections supplied by separate services, where only three hydrants were tested at a time, it was the purpose to make in all groups a measurement of the simultaneous free discharge from six adjacent hydrants, but this was not done in a few instances for the following reasons: In some cases one or more of the hydrants in the chosen group were found so badly out of order that they could not be operated, and the distribution did not permit the addition of others to form a natural group. In a very few cases one of the hydrants in a group selected from the plan location was found not to exist on the ground. The conditions of the tests were much less severe than those which would obtain in fighting the moderately bad fires which occur many times during the year.

ANALYSES OF TESTS.

In the main service, under the conditions obtaining, only 32 per cent. of the hydrants tested gave a free discharge of as much as 600 gallons per minute, a fairly satisfactory supply for a second size fire engine. However, a few of the groups contained hydrants which gave a free discharge considerably in excess of a good supply for a second size engine, and in some cases, if no more than a good supply for such an engine were taken from any hydrant in a group more water would be made available at some of the hydrants which gave low discharges. Accordingly, a careful detailed study of each group tested has been made with reference to the type of hydrant, arrangement and size of the distributing mains, relative locations of hydrants on the mains, and other factors influencing discharge, to determine which of the hydrants giving low yield at the test would furnish a satisfactory supply for a second size engine, when no more than this amount is taken from any one of six adjacent hydrants in the group discharging simultaneously.

This analysis of the tests shows conclusively that not more than 37 per cent. of the hydrants tested can be depended upon to furnish a fair to good supply for a second size engine, and probably somewhat less than this proportion as the classification is made on a strictly conservative basis in every respect.

Of the 560 hydrants tested in the main service only 80, or 14 per cent., under the conditions obtaining will furnish a full supply for a first size engine. Those capable of furnishing such a supply are in most cases of the better type, with 4-inch outlet, supplied from mains of 8 inches, or larger, diameter, save in a few cases of hydrants on 6-inch mains close to large feeders or near the pumping stations.

The important section bounded by Chicago, Kedzie and Belmont avenues and Halstead street—9 square miles—is uniformly weak in hydrant supply. Of the well distributed hydrants tested in this section only 14 per cent. will furnish full supply for a second size engine under the conditions at test. The large area south of Thirty-first street, primarily dependent upon the Sixty-eighth street pumping station, is even weaker in hydrant supply, only 9 per cent. of hydrants tested in this section giving full supply for a good size engine. In the outlying residence sections, particularly to the south of Thirty-first street, many groups gave such low yields that the hydrants are practically useless as a fire fighting utility. In a few instances some hydrants of such groups gave no discharge at all with six hydrants open. In these cases the available supply is, of course, fixed solely by the capacity of the mains to deliver water at the point in question. In the congested value district owing to the higher pressure and larger mains, the hydrants will furnish a much better supply for engines than those in other parts of the city. In this district the tests show that with six engines drawing from adjacent hydrants, more than 90 per cent. of the hydrants will furnish a full supply for a second size engine, and nearly 50 per cent. of them will furnish a good supply for a first size engine.

While the hydrant discharging capacity is dependent on many factors, these do not in the aggregate mask the effect of the pressure owing to its wide variance. To illustrate the effect of pressure upon the flow, the results of all the tests have been averaged, as shown in Table No. 14. This table indicates, as is shown by a careful detailed study of the tests, that discharges from the hydrants become fairly satisfactory only at pressures in the mains upwards of 25 pounds. The table is strongly suggestive of the possibility of radical improvement of present bad conditions through increase of pressure merely. (Table not reproduced here.)

Cleveland. Pressures varied with elevations of gauges and with friction in the mains. They were in most cases sufficient to give good service to the upper stories of houses, except where such houses were located near the line dividing the low service from first high service district.

Syracuse. Pressures remarkably uniform. Apparently not affected by any breaks in mains. The elevation of the two recording gauges was about 10 feet above Syracuse level of Erie canal, and 211 feet below flow-line of Woodland reservoir. The average pressure, as shown by the charts, was about 90 pounds. This may be considered the maximum average pressure of the system as the gauges are located in the lowest part of the city.

Indianapolis. The gauges at the various points agree closely, due allowance being made for elevations and frictions. The normal pressure in the business district averaged 68 pounds during the year. Fire pressure, 110 to 115 pounds.

EXTRACT FROM EXHIBIT NO. 10, REPORT NO. 16, NATIONAL BOARD OF FIRE UNDERWRITERS

October, 1906.

TESTS.

Tests of 100 hydrants in groups well scattered throughout the city were made by National Board engineers in June, 1906. In selecting locations of groups consideration was given to the importance of the fire hazard and to the arrangement and size of the mains. In this latter consideration some of the tests were made at suspected weak points in the system, but aside from those taken in outlying sections most of the tests were made in the vicinity of large mains, and discharges were greater than would be obtained under average conditions. All tests were made under fire pressure, but two were duplicated under domestic pressure.

* * * Hydrants were tested by means of a specially designed apparatus, which measures the velocity of the flow from outlets. In each group it was the purpose to measure the simultaneous free discharge from six adjacent hydrants with all outlets open;

but in two groups five hydrants were available, and in some cases it was impossible to open all outlets.

ANALYSES.

Most of the hydrants tested gave discharges sufficient to supply any engine in the department, and practically all discharged as much as 600 gallons per minute—a fair supply for a second size engine. Poorer discharges in strong parts of the system were generally due to poor type of hydrant. It must be remembered, however, that these quantities were free discharges from hydrants, and that much smaller quantities would be available for effective hydrant streams.

New Haven.

(See also H 22.)

Location of Gauge.	*Elevation Above C. D. (Feet.)*	*Pressure. (Lbs.)*	*Maximum Variation. (Lbs.)*	*Average Variation. (Lbs.)*
Engine House No. 3...	47.9	18 to 33	15	7
Engine House No. 10...	43.8	18 to 33	15	7
Engine House No. 4...	23.1	28 to 43	15	7
Vault at Prospect Hill.	114.7	38 to 53	15	5[1]

H 86. Were pressures fairly uniform?

Chicago. Recorded pressures fairly uniform at pumping stations. Pressures not uniform at points remote from pumping stations.

Cleveland. Yes, for any given location.

Syracuse. Very uniform where these gauges are located, varying about three pounds from noon to midnight.

Indianapolis. Yes.

New Haven. Yes; see above summary. Greatest variation occurred in summer and appeared to be due to use of water for sprinkling by carts and otherwise.

H 87. What was the highest pressure on distributing system recorded?

Chicago. Probable maximum static pressure on nearest hydrants to any station about 40 pounds, not including Washington Heights.

Cleveland. (H 87) What was the highest pressure on distributing system reported?

Ninety pounds at Engine House No. 25.
Sixty-four pounds at Engine House No. 19.
Fifty-nine pounds at Engine House No. 5.

Syracuse. (H 87) What was the highest pressure on distributing system measured? About 91.3 pounds.

Indianapolis. (H 87) What was the highest pressure on distributing system recorded? About 120 pounds near pumping station.

---

[1] This gauge is set on main supplied by Wintergreen lake.

New Haven. Fifty-three pounds. Pressures were doubtless somewhat higher at some points on system where gauges were not maintained.

H 88. *What was the lowest pressure on distributing system recorded?*

Chicago. No recording gauges on distributing system in 1905 but pressure was repeatedly considerably below ten pounds in many places.

Cleveland. (H 88) What was the lowest pressure on distributing system reported? 0.

Syracuse. (H 88) What was the lowest pressure on distributing system measured? 0; at highest points of system where faucets are left running.

(H 88) *What was the lowest pressure on distributing system recorded?*

Indianapolis. Not counting the few occasions when mains burst, or were shut off for repairs or extensions, the lowest pressure in business district was about 15 pounds. Pressures on higher outlying district varied with altitude and to some slight extent with friction in mains.

New Haven. Eighteen pounds. Pressures were doubtless somewhat lower at some other points where gauges were not maintained.

H 89. *Were hydrant pressures recorded?*

Chicago. Not by recording gauges, but taken from time to time by special inspectors in division of water pipe extension.

Cleveland. Not recorded automatically. They were reported by observers.

Syracuse. No. They were occasionally measured.

Indianapolis. No.

New Haven. Recording gauges were not set on hydrants.

H 90. *If so, summarize records.*

Chicago. Estimating from gauges in pumping stations and from reports of tests made over system at various times, the average static pressure on hydrants nearest pumping stations was about 34 pounds; the average static pressure at hydrants over entire system, about 20 pounds; and over certain large areas in the southwest the average static pressure was about 10 pounds.

Cleveland, Indianapolis, New Haven. ———

Syracuse. No records kept.

H 91. *Were complaints numerous as to pressure?*

Chicago. Yes; very.

Cleveland. Not very numerous. There were some complaints, principally from owners of high buildings located on high points in low service district.

Syracuse. There are some houses on the system, especially those on the hills near the Syracuse University, which are so high that they do not have good pressures. In 10 or 12 of these houses water will flow only in the cellars, and when water is low in Woodland reservoir, as was the case in February, 1905, the persons living in these houses are without water. Some of them leave their faucets open, relying upon water ram in the mains to fill tanks in the cellars from which water is often pumped by hand to attic tanks. Most of these houses are comparatively new, having been built on the hills since the reservoir was constructed.

Indianapolis. No.

New Haven. Not very.

H 92. Were there frequent complaints about interruption of service?

Chicago. Houses in certain districts can only get water in their upper stories by filling tanks at night. Private pumps required in all high buildings.

Cleveland. No.

Syracuse, Indianapolis, New Haven. No.

For Syracuse see answer to H 91.

H 93. Has the water supply ever been cut off from the city? Describe instances.

Chicago. Never from the entire city at once. There are eight pumping stations, not including Washington Heights or Norwood Park, and their mains are interconnected.

Cleveland. On February 11 the pressure on West Side dropped for three hours as the result of a break in 30-inch main. On April 25 and July 8 the pressure dropped for short times as a result of shut-down of engines at Kirtland street station. The supply was never cut off from the entire city at any time during 1905.

Syracuse. No.

Indianapolis.

EXHIBIT 8. INTERVIEW WITH CHIEF OF INDIANAPOLIS FIRE DEPARTMENT.

Badger fire. Breaking of 20-inch main, November 22, 1905.

On November 22, 1905, at 10:32 a. m., alarm was sent in from Box No. 45. Pressure was raised in about 6 minutes from 55 to 100 pounds, at which time the 20-inch main burst at Ohio street, between Delaware and Pennsylvania streets. The pressure immediately dropped to 8 pounds, remaining there from about 10:43 to 11 a. m. At that time, the gates having been closed, the pressure began to rise, and reached 100 pounds about 11:28 a. m. It then varied between 100 and 80 pounds until about 1:30 p. m., the fire being then called out, pressure was lowered to normal of about 55 pounds.

The Brice Bakery fire, Capitol avenue and Washington, Box 93, 9 p. m., on August 5, 1905.

Alarm was rung in from Box 93. In about two minutes pressure had risen from 90 to 100 pounds, headquarters gauge, and had been maintained at that pressure for only about 5 minutes when the plug in the 30-inch main at Capitol and Washington streets burst. The pressure at once dropped to 0 and remained below 5 pounds for about 1 hour and 10 minutes, or until 10:40 p. m., and then rose until at 11:10 p. m. it had reached 60 pounds, which is the normal pressure in this district. The fire, meantime, was handled by the fire department from cisterns.

The recording gauge at headquarters was put in March 20, 1905. The recording gauges at the other engine houses were put in during the next week. The recording gauge at the water company's office was put in May 5, 1905.

On April 19, 1905, fire alarm was rung from Box 13 at 11:42 a. m. The pressure at that time was about 60 pounds. In about 5 minutes the pressure had risen to about 93 pounds, at which point it had been maintained for perhaps 9 minutes, or until 11:56 a. m., when the L of the discharge pipe from the Gaskill engine blew off. The pressure immediately dropped to about 10 pounds, remaining there until 12:25, when it began to rise, and was restored to normal of 48 pounds at 1 p. m.

There were 1,100 alarms of fire in the year and four breaks causing serious loss of pressure. All four breaks were in the new pipe. The fire chief says he thinks the system strong enough to stand all the pressure needed. He, however, wants some new hydrants to replace those of the Holly make, which are still partly in use. In one district of one mile square there are 60 of these hydrants. The chief says they are out of date and do not work right, that they are hard to open and do not give a full enough stream owing to the choked neck of the hydrant. He would like to have them replaced by two-way Matthews hydrants. The Holly hydrants have 4-inch connections and there are a good many of them in the residence districts. The chief says that at first most of the Holly hydrants were of the two-way type, but that the water company closed up one way in a good many of them, making them single way hydrants, which the chief thinks was not a bad thing, but that they have since opened up some of them again.

New Haven. Water supply has never been cut off from city.

EXTENSIONS.

H 94. *What factors have determined the extent and location of extensions?*

Chicago. Engineers in division of water pipe extension make recommendations based upon general requirements of territory to be supplied, both as to pressure and present and future needs of private consumers. After approval of recommendations by city engineer and commissioner of public works, city council decides whether extensions shall be made.

EXHIBIT 6.

Extract from report by Mr. W. A. Levering, superintendent of division of water pipe extension.

DISTRIBUTION SYSTEM, HOW WATER MAINS ARE LAID.

(See H 60.)

The extension of large feeder mains is paid for from the water fund and is included each year in the annual appropriation. These mains are not tapped for private supply, therefore no assessment is levied on adjacent property fronting on streets where these mains are laid. The various methods adopted by the city of Chicago under which small water mains are laid for the supply of the consumer are classified under the following heads:

Revenue,
Special Assessment,
Deposit,
Circulation.

REVENUE.

Under this method water mains are laid by the city without expense to the property owner where there are sufficient houses to pay an annual revenue of ten cents (10c.) per lineal foot (from water rates) from the nearest connecting main, city council first passing an order directing that the extension be made. There were approximately 35,894 feet of various sizes of pipe laid for this purpose during the year 1905; cost, $36,647.17.

SPECIAL ASSESSMENT.

Where extension is required and there are not sufficient houses to meet the 10 cents per foot requirement, and where streets are to be improved in which mains should be laid before street is paved, the extension is made by special assessment on property benefited, under the direction of the board of local improvements. The total cost of the work is assessed against the property. When a sufficient number of houses are built along the line of pipe laid, to guarantee the payment of the revenue from the water rates, a refund of ninety per cent. (90 per cent.) of the total cost of the work is made to the property owner, ten per cent. (10 per cent.) being deducted for cost of spreading assessment. If there is money in the water fund at the time the main pays the required revenue, then a refund is made without delay; otherwise a 3½ per cent. bond is issued which expires thirteen (13) years after date of original payment for extension. This year 48,804 feet of various size of pipe were laid by special assessment at a total cost of $56,729.55. In connection with these extensions 76 estimates were prepared and plans and specifications and contracts were made for extensions in 66 streets.

DEPOSIT.

In the streets where the major portion of the frontage is controlled by one property owner who desires to improve his property prior to building or for other reasons, and wishes to avoid the delay raised by spreading a special assessment, the total cost of the work is often advanced by each property owner, and, upon completion of the work, in case there is an unappropriated surplus in the water fund, the city agrees in certificate issued to depositor to refund without interest the total amount paid by him for the work, in case a revenue of ten cents (10c.) per lineal foot for water rates is derived within the first two years after such deposit. If no refund is made within the first two years then the city pays interest at 3½ per cent. per annum after the expiration of said two years until paid. In case there are buildings enough to pay the revenue of ten cents (10c.) per foot prior to thirteen (13) years after date of deposit, and there is no unappropriated surplus in the water fund to meet the obligation, then a three and one-half per cent. bond is issued, which is due and collectable 13 years after date of original deposit. In 1903 there were 26,057 feet of pipe of various sizes laid at a total cost of $29,211.23, by deposit.

CIRCULATION.

In making the numerous extensions as set forth under above methods there are necessarily a number of dead ends left in water pipe system along sidling property where revenue cannot be furnished or special assessment spread. These extensions are made by the city from the general appropriation in order to eliminate this condition from the system, and must be done in order to give sufficient circulation and pressure throughout the system. There were 18,832 feet of various sizes of pipe laid for this purpose during the year 1903; cost, $20,320.

On all streets to be paved or repaved an investigation is made to ascertain if the mains are at a sufficient depth and are adequate for the supply of the property fronting on the street to be improved. Where the mains do not meet these requirements they are replaced with mains of larger size or lowered where necessary, and additional hydrants and valves are set as required. In 1903, 30 miles of streets were paved and 79,509 feet of pipe were replaced by larger pipe in these streets; cost, $122,689.78. Extensions of larger size mains for general supply are noted elsewhere under a heading of "Important work done during the year 1903."

Cleveland. Extensions are considered on petition. If the estimated revenue for the first year is 6 per cent. or more of the cost of the extension, and if the street has been dedicated and accepted, the extension will be made. So far extensions of this class have not been delayed by lack of funds. Where local wells have been condemned by the health department on premises in front of which there are not mains, the water department has occasionally, on request of the health department, extended its mains to such premises, even when revenues for the first year were less than 6 per cent. of the cost of the extension. Parties opening real estate allotments or additions may secure the extension of mains on making a deposit of $1 per lineal foot of mains. The size of such mains is at the discretion of the department, but is never less than 6 inches unless two lines are laid in one street, in which case one main is 6 inches or more and the other may be 4 inches. The deposit of $1 per lineal foot is refunded when the revenue from water rents amounts to 6 per cent. of the cost of the extension, provided the street is at that time properly dedicated and accepted. But when a 4-inch and a larger pipe is laid on the same street, as is sometimes done to avoid service connections across the street, the whole cost of the 4-inch main is paid in advance by the property owners, in addition to $1 per foot of the larger main, and the cost of the 4-inch is not refunded. Mains are also laid by the city without cost to abutting property owners on streets about to be paved, but this does not often happen as the main is usually laid before the demand for paving arises.

Syracuse. Extensions usually made on petition by property owners to commissioner of public works. Petition is referred to deputy city engineer, who goes over the line of proposed extension to see what revenue would be derived therefrom and the general necessity for the extension. Where the receipts will pay a reasonable return on the cost the extension is made. In occasional instances where the street requires a heavy cut or fill to bring it to permanent grade the department will extend the main, provided the property owners will bring the street to grade. In all cases a frontage tax of 5 cents per foot is levied on all property fronting on eash side of the street in which main is laid. But when the property owner pays water rates no part of this frontage tax is collected unless the frontage tax be greater than the water rate, in which case he pays the difference between his water rate and his frontage tax in addition to his water rate.

Indianapolis. The city has power to direct where extensions shall be made up to 40,000 feet per year. During the past 15 years the company has laid 1,034,787 feet of mains, an average of 68,986 feet per year. Extent and location, in excess of the statutory 40,000 feet, determined by existing or anticipated demands and estimated revenue.

New Haven. Usually the demand for water. Applicant for extension files petition with company—blank petition attached hereto, exhibit 9. The route is inspected. If street is permanently graded, or if city engineer can give permanent grade, the directors vote to lay the pipe. Mr. David Daggett, secretary of the New Haven Water company, states that during his connection with the company he has never known of a refusal to extend mains on petition within the city limits, also that mains will be extended in suburbs, provided reasonable revenue, not necessarily for the first year, but within a reasonable number of years, be assured.

EXHIBIT 9.

New Haven..............190..

We, the undersigned property owners on..............street, hereby petition the New Haven Water company to lay a water main in said street..............street, a distance of............feet. In consideration of this water main being laid we hereby promise and agree to connect our several houses or buildings with said water main within 60 days after the laying of said water main, and to take and pay for the water service, or, in case we do not carry out the above agreement and in lieu thereof, we hereby severally promise and agree to pay to the said water company a sum of* .... dollars per annum in semi-annual payments for each and every one whose signature is attached hereto, until such time as our several houses or buildings are connected with and using the water from said water mains.

	Uses.							
Names.	*No. Faucets.*	*No. Baths.*	*No. Water Closets.*	*No. Sill Cocks.*	*No. Horses.*	*No. Stores.*	*Other Uses.*	*Income.*

H 95. Is the built-up area well served so that all citizens may use the service?

Chicago. There are mains in a *fair* proportion of streets in built-up sections but pressures are very low.

Cleveland. The built-up area is well served.

Syracuse. Yes, as a rule.

Indianapolis. Yes, in most cases.

New Haven. Yes, to an unusual extent. There are mains on almost every street in the city. See plate 3. (Plate 3, blueprint, not reproduced here.)

H 96. Has the policy in respect to extensions been liberal?

Chicago. Apparently fairly liberal on the whole; there were, however, many demands, and available appropriations were often limited.

Cleveland. See answer to H 94.

Syracuse. The frontage tax alone will pay good interest on all sizes of mains from 12 inches down, so that the department cannot well lose money by extensions.

Indianapolis and *New Haven.* Yes, apparently.

H 97. Total length of extensions during past year.

Chicago. Of various sizes from 4-inch to 36-inch, 361,101 feet.

Cleveland. Laid by department, 95,551 feet. There were also acquired by annexation 138,518 feet of pipe, but this cannot be considered as extensions in the ordinary sense.

Syracuse. 3.87 miles or 20,434 feet.

Indianapolis. 52,901 feet.

---

* The amount written in this space is $5.00 for extensions in city of New Haven; for suburbs it may be $5, $7, or $10. D. H. M.

Exhibit 10 (blueprint not reproduced here) shows feet of pipe laid each year from 1889 to 1906, distinguishing pipe relaid.

New Haven. About 28,000 feet.

H 98. Have the citizens of any section petitioned for extensions to their district within the last five years?

Chicago. Yes.

Cleveland and *Syracuse.* Many times.

Indianapolis. To the council, yes.

New Haven. Yes.

H 99. As between several sections petitioning at one time how were extensions determined and in what order?

Chicago. First by recommendations of engineers based on careful canvass to determine present and future needs of territory; after that council decides the order in which extensions should be made, the influence of individual aldermen sometimes deciding the matter.

Cleveland. The petitions are acted upon by the board of public service in the order in which the inspectors report the estimated revenues from the extensions.

Syracuse. The decision was usually made upon the recommendation of the deputy city engineer, the desire to make the least expenditure serve the greatest number and the ultimate needs of the service being the governing considerations.

Indianapolis. That question is decided by the city council.

New Haven. By the apparent needs and probable future of the section.

H 100. Were extensions made promptly when there was a demand?

Chicago. Not always promptly ordered by council. Once ordered they were made promptly by division of water pipe extension.

Cleveland. Subject to conditions as given in answer to H 94 and H 99 and to ability of pipe gangs to complete the work, yes. Extensions are usually completed in three or four weeks after they have been ordered by board of public service.

Syracuse. Subject to above conditions (H 99), yes, as a rule.

Indianapolis. Yes.

New Haven. Yes, in the order of the applications and of the needs of the respective localities.

H 101. Was every applicant for service able to get it promptly?

Chicago. If main was already laid and service pipe was wanted, yes. Otherwise no.

Cleveland. Provided the extension was ordered as explained in answer to H 94 and H 99; yes, as a rule; otherwise the extension was not made.

Syracuse. Subject to above conditions (H 99), yes.

Indianapolis. Service connections to mains, yes. Extensions of mains, not always.

New Haven. As a rule, yes.

H 102. Has the necessity for the passage of an ordinance ever caused delay in extending service?

Chicago. Yes, frequently.

Cleveland. The extensions are ordered by board of public service; no ordinance required except regular semi-annual appropriation ordinance, and work on mains extended on petition was not delayed for lack of funds.

Syracuse. No ordinance required for extending mains.

Indianapolis. Sometimes.

New Haven. No.

H 103. Has service been extended in advance of the demand in order to stimulate the growth of the district, or has it awaited the demand?

Chicago. As a rule the demand has always preceded the extension.

Cleveland and *Syracuse.* It has generally awaited the demand.

Indianapolis. It has been repeatedly extended in advance of ordinances and in advance of the demand.

New Haven. It has often been extended in advance.

H 104. Was the department free to use its judgment about extensions or was an ordinance required authorizing the extensions?

Chicago. Ordinances were always required.

Cleveland. Ordinance not required. Board of public service made extensions on conditions previously explained in answers to H 94 and H 99.

Syracuse. Department was free to use its own judgment, no ordinance being required.

Indianapolis. The company was free to extend mains where it wished.

New Haven. Free, save as bound by contract with the city.

H 105. May service be extended to suburban sections not within the city limits?

Chicago. Mains are not laid outside of city limits. Under law creating sanitary district of Chicago city is compelled, upon proper petition from villages adjacent to city limits and within sanitary district, to lay mains as far as the city limits for the supply of such villages.

The town of Cicero, for example, is supplied by meter through a 16-inch main extended for the purpose as far as the city limits.

Cleveland. Yes, by special agreement between board of public service and the suburb desiring the extension, the agreement being duly authorized by city council. The city generally lays pipe to limits, the suburb laying pipe within its own territory. A meter is set at the city limits at the expense of the suburb. The meter rate charged by the city to the suburb varies from 25 per cent. to 100 per cent. above the rate in force in the city, according to quantity consumed and according to whether suburb is supplied from low or high service mains The use of water by suburb is subject to all water works rules, regulations and ordinances in force in the city.

Syracuse. No.

Indianapolis. It may be done. The company will make such extensions on the basis of what it considers a fair earning value per mile of main.

New Haven. Yes; outlying towns are named in an amendment to the company's charter, of which the writer has, however, seen no copy.

STREET WORK.

H 106. Was street work done by direct employment or contract?

Chicago. Both. Mostly by direct employment. Sometimes by contract, but only in case of mains laid by special assessment.

Cleveland. By direct employment.

Syracuse. In 1905 by direct employment. When the city first took charge of the plant it overhauled and greatly extended the distribution system, and about 100 miles of mains were laid by contract. Since 1895 all mains have been laid by department.

Indianapolis. By both.

New Haven. Direct.

H 107. Was the work done by contract properly inspected?

Chicago. Apparently, yes.

Cleveland. No contract work.

Syracuse. Yes.

Indianapolis. Yes.

New Haven. No street work done by contract.

H 108. Was the work performed in an efficient manner?

Chicago, New Haven. Apparently, yes.

Cleveland, Indianapolis. Yes, as a rule.

Syracuse. Yes.

H 109. Was the street surface promptly restored after openings were made?

Chicago. Yes.

Cleveland. Usually, yes.

Syracuse. Yes.

Indianapolis. Yes.

New Haven. Apparently, yes.

H 110. Was water used in puddling ditches?

Chicago and *Cleveland*. Where necessary, yes.

Syracuse. In certain classes of soil, yes.

Indianapolis and *New Haven*. When necessary, yes.

H 111. Were open trenches and obstructions properly guarded?

Chicago, Cleveland, Syracuse, Indianapolis. Yes.

New Haven. Apparently yes.

H 112. How are sunken trenches taken care of?

Chicago. Refilled and resurfaced. Work is gone over after a lapse of a few months, inspected, and where necessary, repaired.

Cleveland. Refilled as soon as depressions are noticed. The department endeavors to inspect new trenches after rains or thaws to note any settlement.

Syracuse. Bureau of water is under the commissioner of public works. After the trench has been filled by bureau of water, the street is subsequently cared for by bureau of street repairs, which is also under the commissioner of public works.

Indianapolis. Filled in as the depressions appear.

New Haven. Refilled as soon as depressions are noticed.

H 113. What has been the policy in regard to improving the conditions of street services prior to street paving or repaving?

Chicago. The question of proper size of mains, and of repairs to service pipes is always studied by division of water pipe extension and recommendations made to the city council, which then takes what action it may deem proper.

Cleveland. Prior to paving or repaving, all mains 12 inches or less and all service connections having less than 5½ feet of cover are lowered. If mains are too small, larger ones are laid. In business districts a second main is often laid on the opposite side of the street from the existing main. On important streets 6-inch hydrants are substituted for 4-inch hydrants. Property owners are compelled to put in service connections to lots not already supplied.

Syracuse. Where there is any reason to suspect that service pipe is out of order or above the frost line or will require repairs in a short time, it is dug up and replaced by a new one if necessary.

Indianapolis. The services are owned by consumers and maintained by them.

New Haven. Company does not lay service pipes. City engineer notifies all property owners to put in service pipes.

H 114. Is there an up-to-date map showing the location and nature of all street mains and fixtures?

Chicago. Yes; atlases showing mains and other showing service pipes.

Cleveland. There is an unusually good set of maps which were in June, 1906, up to date in so far as extensions for 1904 were concerned. Owing to press of other work the extensions made in 1905 had not yet been put on the maps.

Syracuse. A map showing the general location of mains and valves—scale 1,000 feet to 1 inch—is kept fairly up to date, but this map is too small to allow measurements of valves to be shown. There are also 35 field books showing mains and specials with measurements for all work done by the city and for some of the 20 miles of mains still remaining of the old water company's system. Also a Sanborn-Perris fire insurance atlas (2 volumes) published 1892, and amended to 1894—scale 50 feet to 1 inch—on the maps of which perhaps 50 per cent. of all the mains and specials are shown, having been put on during the last five or six years. See also answer to H 22.

Indianapolis. Yes.

New Haven. A very good set of five wall-maps, scale 400 feet to the inch, corrected up to the first of the current year, showing mains, valves, and hydrants, but no specials. One general map (blueprint plate 3, not reproduced here), 1,000 feet to the inch, showing mains, and streets in which there are no mains. Mains are also shown on office copies of fire insurance atlases of city. A card index gives location and measurements for all gate valves; also card index to taps; also a record of all extensions of pipe.

H 115. Who decides where underground structures shall be located in the street?

Chicago. The city engineer.

Cleveland. The board of public service.

Syracuse. The commissioner of public works. Usually on recommendation of bureau of engineering.

Indianapolis. The city engineer.

New Haven. Superintendent of streets.

H 116. Is a permit from a public authority required before street may be opened?

Chicago. Yes, from superintendent of streets. In emergency, street is opened at once and permit obtained next day.

Cleveland. The water department may open no paved street without a permit. On paved streets a permit from the street department is required, except that for emergency repairs the permit may be obtained after the work is done.

Syracuse. The bureau of water, being a part of the department of public works, does not require a permit.

Indianapolis. No, except when the street is being improved and is in the hands of a contractor.

New Haven. Yes.

H 117. Is a separate permit obtained for each opening?

Chicago. Yes.

Cleveland. Where permit is required at all a separate permit is obtained for each opening.

Syracuse. No permit required.

Indianapolis. No, except as above stated.

New Haven. Yes.

PURCHASE OF SUPPLIES.

H 118. Who placed the orders for materials and who governed the placing of orders?

Chicago. For purchases amounting to less than $500, a requisition is first made out by the superintendent or foreman needing the supplies, and submitted to head of his department for approval. The head of the department then transmits the requisition to the city engineer and commissioner of public works for their approval, after which it is forwarded to the business agent of the city of Chicago. The business agent must then obtain bids from at least 3 parties, and the order may then be placed with the most satisfactory bidder, price and quality both considered.

Cleveland. Orders not exceeding $500 were placed by purchasing agent for water department, under direction of superintendent. For purchases amounting to more than $500, the law requires that the expenditure must be first authorized by the city council and then let by contract after at least two weeks' notice in one or more local daily papers. The board of public service then makes the award of contract, usually upon recommendation of superintendent.

Syracuse. Purchases amounting to less than $50 were made, as a rule, by the clerk in the office of water works repair shop. The board of contracts and supply, composed of mayor, commissioner of public works, corporation counsel, city engineer and comptroller, has charge of letting all contracts.

Indianapolis. The purchasing department of the company.

New Haven. Large purchases made by president and secretary; small purchases made by superintendent.

H 119. Were contracts advertised?

Chicago. For contracts involving expenditure of $500 or more, specifications are prepared by the head of the department for which the supplies are needed, submitted to the city engineer and commissioner of public works for their approval, and thereafter advertised by the commissioner of public works, who finally awards the contract.

Cleveland. The law requires that contracts involving the expenditure of more than $500 be advertised.

Syracuse. The law provides that all purchases amounting to $50, or more, shall be let by contract to the lowest bidder after advertisement in at least two local papers. In purchasing certain classes of goods, such as hydrants or valves, this law has been found burdensome, as the bureau could not be sure of getting the type of goods it desired unless they were purchased one article at a time.

Indianapolis. No.

New Haven. Not as a rule.

H 120. What system was used to check the quality of materials and weights or measurements of shipments?

Chicago. All materials were inspected; machinery and pipe inspected by professional inspectors at works or foundries; cement, brick, etc., tested in the city laboratory.

Cleveland. Goods are received either by foremen or heads of divisions, who must make out a written certificate as to quality and quantity of the goods. These certificates appear at the bottom of the order. The purchasing agent certifies as to the correctness of the price; the auditing department certifies as to the correctness of the footings and extensions of figures; and the superintendent approves the bill; then the board of public service authorizes its payment.

Syracuse. The pipe inspector is sent to the factory and stays there until shipment is made. Pipe and other materials are inspected on delivery.

Indianapolis. Checked first on cars by receiving clerk and by warehouse or yard attendant on delivery to him.

New Haven. Materials inspected and weighed or measured on receipt.

H 121. What redress is there in case of shortage or poor quality of shipments?

Chicago. The redress available is embodied in the specifications or orders for the goods.

Cleveland. Bills are not supposed to be paid until proper goods, both as to quantity and quality, are received.

Syracuse. Bills are not approved for payment until proper goods are delivered.

Indianapolis. Contracts for material provide for rejection of inferior goods.

New Haven. Goods are returned or allowances made for shortage.

H 122. How did prices and quality compare with those paid by private companies?

Chicago. It is believed that as a rule prices were about as low as those enjoyed by other concerns ordering in similar quantities. Some few exceptions noted, principally in case of valves built by city. The city is also believed to have paid too much for some of the tunnels and for one of the cribs. See also H 33-34.

Cleveland. Believed to compare fairly well.

Syracuse. In so far as could be ascertained, prices were approximately the same.

Indianapolis and *New Haven.* ———.

H 123. Were the dealers supplying materials connected with city, county, or state governments?

Chicago. The law forbids this. There have been rumors that this law has not always been complied with, but the writer is unable to cite specific instances, or to say whether the rumors were true.

Cleveland and *Syracuse.* This is forbidden by law.

Indianapolis. ———.

New Haven. Company buys where it can buy best.

H 124. Were local dealers favored over those outside of the city?

In the case of each of the five plants, other things being equal, yes.

H 125. Was there delay in placing orders after the engineer or superintendent expressed the necessity for the supplies?

Chicago. Sometimes.

EXHIBIT 1.

Report of City Engineer Ericson, May, 1905, page 19: "When in 1897, as city engineer, the undersigned assumed charge of the water works under the commissioner of public works, the first great task that confronted him was the improvement and unification of all of the detached systems. * * *

As an illustration to show how many years were allowed to elapse before recommendations made were acted upon, I take the liberty of calling attention to a letter written in October, 1893, and which is as follows:

Chicago, October 24, 1893.

S. G. Artingstall, Esq.,
City Engineer.

Dear Sir:

I beg leave to submit in the following a report on the necessity of changes and additions in the water supply system. First, the necessity of extending the seven-foot tunnel, terminating at the crib located at the northwesterly end of the government breakwater, is obvious for several reasons. This tunnel, in the first place, is at present entirely useless on account of the water drawn from this point being unfit for domestic purposes, owing to its proximity to shore and almost constant contamination by sewage, as has also been shown by the increase of typhoid fever cases whenever water from this inlet has been pumped into the mains. The death rates from typhoid fever per thousand deaths in the district supplied with water drawn from the two-mile crib and mixed with water drawn from the shore tunnel, both before and after it was extended, compared with the death rate from the same causes in other districts, are for the years 1890, 1891 and 1892 as follows:

1890, Chicago Avenue district, 1 to 1.53; other districts, .77 to .90. From data compiled by the sanitary district of Chicago: In 1891, Chicago Avenue district, 1.75 to 1.83; other districts, .32 to .93. In 1892 Chicago Avenue district, 1.05 to 1.07; other districts, .10 to .85. The shore inlet has not been open since February, 1893.

The capacity of the two old tunnels is not sufficient for present demand and with present arrangement of the pumping plant at the Chicago Avenue pumping station. The water in the wells at Chicago avenue is frequently drawn down to 7½ feet below datum, at which stage of the water the two old 1857 and 1853 engines are disabled, the tops of suction slits being only —8.9 and —8.3 respectively, and the north, or 1867 engines, do very little work. The capacity of both tunnels at this stage should in their present probable condition be about 115,000,000 gallons per twenty-four hours. The Chicago avenue pumps take up about 70,000,000 gallons, leaving 45,000,000 gallons for the West Side. The capacity of the last named plant is 60,000,000 gallons per twenty-four hours. It will thus be seen that not only is the breakwater tunnel useless until extended, but the capacity of the old two-mile tunnel is insufficient, at least with present arrangement of the pumps, and since the demands for more water are steadily increasing, I deem it of the utmost importance that this shore or southeast breakwater tunnel be extended to the two-mile crib at the earlies possible date. If changes in the machinery, as hereinafter suggested, are made, the total capacity of the Chicago avenue plant should be about 93,000,000 gallons per twenty-four hours, which, added to the capacity of the west pumping station—60,000,000 gallons—makes a total of 153,000,000 gallons per twenty-four hours. This, the two tunnels cannot supply: If the seven-foot shore tunnel is extended so that it can be safely used, the three tunnels will furnish this amount of water without the water in the wells at Chicago avenue getting lower than about 4.8 below datum, and at the west pumping works about 10.3 feet below datum. This result is obtained, assuming the surface of the water in the lake to be at datum.

Second. As has been before stated, whenever the water in the wells reaches an elevation of 7½ feet below datum, the two middle engines, known as the 1853 and 1857 engines, can pump no water. Aside from this fact, these engines are very old, defective and inefficient, and should be removed at once and pumps of modern construction put in their places. In regard to the north, or 1867, engines, I wish to mention in this report that although the machinery seems to be in fairly good condition, the arrangement of the water ends of these pumps is such as to *greatly* reduce the efficiency of the pumps. It will be economical and good policy to replace the old "water ends" with new ones of modern design, properly arranged.

Third. The three Allis engines at the Fourteenth street pumping station are run steadily night and day with an occasional stop for one hour or two in the night time in order to put in new packing, etc. The pressure on the mains at this station averages about 40 pounds per square inch. It has been noticed that whenever any one of these pumps is stopped, the pressure immediately falls about 20 pounds per square inch. The pressure at the Sixty-eighth street pumping station also falls some pounds simultaneously. If at any time any one of the engines should be disabled, necessitating the stopping of the same for perhaps days, the effect would be felt over a large district, and an unnatural strain put on other pumping stations. Wherever the direct pressure system of supply is used, there should always be an ample reserve of machinery. This is not the case at the Fourteenth street pumping station.

The foundations are in place for a fourth engine at this station, and the work of putting in new engines cannot be commenced too soon. Measurements of the well and foundations of the 1853 and 1857 engines have been taken, and a drawing, showing the same, is filed in this office.

Respectfully,
(Signed.) JOHN ERICSON,
Assistant City Engineer.

Means were finally provided in 1902 for the replacement of three antiquated machines at the north pumping station, and at this writing (May, 1905), a modern pumping engine has taken the place of the two oldest ones, and two more have been constructed, and will be installed and in operation as soon as the circumstances will permit. Each of the new pumping engines will have a capacity of 25,000,000 gallons per twenty-four hours. The additional engine, recommended for the Fourteenth street pumping station was installed in 1898, or five years after the above recommendation was made. In addition to the above, the capacity of three of the pumps at Sixty-eighth street station and one at Lake View was increased from 13,000,000 to about 16,000,000 gallons per day for each engine. During the last six or seven years the pumping capacity at the various stations has been increased as follows:

Lake View pumping station	16,000,000	gals. daily
Springfield avenue pumping station	60,000,000	" "
Central Park pumping station	60,000,000	" "
Sixty-eighth street pumping station	20,000,000	" "
Fourteenth street pumping station	20,000,000	" "
Washington Heights pumping station	1,500,000	" "
Norwood Park pumping station	350,000	" "
The total additional capacity	177,850,000	" "

A new boiler plant was installed at the Chicago avenue station and another at the Fourteenth street station.

Cleveland. Occasionally, yes; as a rule, no.

Syracuse. The law requiring advertising for bids on all purchases of $50.00 or over causes some delay. On smaller purchases there was usually no delay.

Indianapolis and *New Haven.* No.

H 126. In practice did the manager get the types and makes of things he asked for or was he forced to take something else?

Chicago. As a rule the supplies, when received, were what were needed.

Cleveland. He generally got what he asked for.

Syracuse. He usually got what he asked for.

Indianapolis. He usually got what he needed. The purchase and delivery of supplies appear to have been well attended to.

New Haven. He usually got what he wanted.

H 127. Were the bills for materials purchased paid promptly?

Chicago. Not invariably, but as a general rule, yes.

Cleveland. Approved bills are usually paid promptly.

Syracuse. Yes. Bills for materials purchased are presented to the head of the bureau ordering the material. After approval by him, the bill goes to the comptroller, who audits it on the following Friday and issues warrant for payment by city treasurer on or about the following Tuesday.

Indianapolis. Every 30 days.

New Haven. Apparently yes.

GENERAL MATTERS.

H 128. Is the plant adequately equipped to handle the business?

Chicago. Pressures are too low. Consumption is already too close to capacity of pumps and mains. With higher pressure consumption would be larger. See also H 5 and H 131.

Cleveland. Generally speaking, yes.

Syracuse, Indianapolis and *New Haven.* Yes.

H 129. Is the equipment of modern and efficient type?

Chicago. Part of it is and part of it is not.

Chicago Avenue pumping station, the oldest in the city, is undergoing extensive repairs. The main engine-room was formerly equipped with the first engines ever installed by the city, including one affectionately known as "Sally," erected in 1853. These old engines are all being replaced by three new 25,000,000 gallon, Riedler pumping engines, one of which has been running for some months, while the second is almost completed. Coal for the old boiler room at this station is hauled by teams, unloaded in covered sheds, and wheeled in barrows over platform scales to where it can be shoveled by hand into the magazines of the Murphy automatic stokers. In the new boiler rooms, there is a coal conveying plant. The coal is hauled by wagons over wagon scales and dumped into crusher, whence it is carried to overhead bins, the ashes being removed by the same conveyor. The boilers have Hawley down-draft furnaces with gravity feed, regulated by hand levers from bins to upper grates. There is a Smith independently fired superheater, which will not be used until all three of the new Riedler pumping engines are installed. The station has a gravity oil feed system, an independent electric light plant, a 20-ton traveling crane in the main engine room, but none in the Holly engine room, and a small machine shop with power driven lathe, shaper, drill press, emery wheel, grindstone, and a forge. This station was slightly damaged by the great fire, but its buildings, including the masonry structure surrounding the standpipe, still present a very handsome architectural appearance.

The Twenty-second Street pumping station, or west station, as it is sometimes called, needs an entirely new mechanical equipment. The station building is large enough to house a plant of much greater capacity, and is still in a good state of preservation. Except for the floors, which are kept clean, the whole interior of the station needs cleaning and painting. The engines and boilers are antiquated, the engines being practically obsolete. Coal is hauled by wagons and dumped into a coal shed, thence wheeled in barrows to fire room and hand-fired to Hawley down-draft furnaces.

The Harrison Street station has two engines, which, although seventeen years in service, are still in first rate condition, and work almost continuously at a very creditable duty. The boilers are old and are being replaced as fast as possible by new ones. There is no traveling crane nor machine shop. Coal is hauled in wagons over wagon scales to coal room and thence wheeled in barrows over platform scales and dumped in front of boilers. Boilers have Murphy furnaces and automatic stokers.

The Fourteenth Street station. The interior of this station presents a fine appearance and the machinery is well cared for. Coal is dumped from wagons through a manhole in the street into the hopper of the crusher. After passing through the crusher, it is conveyed to overhead bins, the same conveyor removing the ashes. Some of the boilers have Hawley down-draft furnaces and some the Roney stokers. The coal is weighed to all boilers by Richardson automatic weighing machines. There is no traveling crane in engine room, but the station has a small machine shop with power driven lathe, shaper, drill press, hacksaw, grindstone, emery wheel, and a portable forge.

The Sixty-eighth Street pumping station presents a good exterior appearance and is neatly kept. Coal is unloaded from cars into the covered shed, whence it is shoveled by hand into tramcars and pushed along tracks in front of boilers. There is a separate engine and dynamo for station lighting. There is also a small machine shop with power-driven lathe, shaper, drill press, grindstone, and a forge, anvil, bench and vise. There is no traveling crane, and unless the roof be raised it will not be feasible to install one.

Lake View pumping station, though smaller than the Sixty-eighth street station, resembles it somewhat in general architecture. The station is well kept. Boilers are old and are being renewed as fast as possible. Coal is hauled in wagons over wagon scales and unloaded in coal rooms, thence loaded by shovels into tramcars, pushed along tracks in front of boilers, and hand-fired to furnaces, which are of the Hawley down-draft type. There is no traveling crane, nor machine tools of any sort.

The Central Park Avenue and Springfield Avenue pumping stations are the newest of all the city stations. The general design of the two stations is very similar, and their equipment is practically identical. The buildings are handsome and conveniently arranged and are well kept. Each station has a plant for conveying coal to bins and removing ashes; automatic weighing devices; hand-fired Hawley down-draft furnaces; 15-ton traveling crane; electric light plant, and machine shop with power-driven lathe, shaper, drill press, emery wheel, and a forge. The boilers at both stations are equipped with Foster superheaters. Exhibit 4 attached hereto describes these stations more in detail. (Exhibit 4 not reproduced here.)

Washington Heights pumping station is a small brick building. It has no modern appliances for handling coal and the size of the plant would not justify their installation. New pipes and boilers are being installed, and the plant is being put into good working order.

Norwood Park pumping station is an old frame building, and all of the equipment at this small station is more or less inadequate. There are no modern appliances for the handling of coal, and the size of the plant would not justify their installation. The station is neither neat nor attractive in appearance.

Cleveland. As a rule, yes; except that some of the pumping engines, mostly held in reserve, are somewhat antiquated as to type, though in fair condition.

Syracuse. As a rule, yes. Some parts of the plant are very good.

Indianapolis. As a general rule, yes. The steam pumps at the old station are antiquated and inefficient, but as these are only run occasionally, it would hardly pay to replace them just yet.

New Haven. One pump at Whitneyville station is obsolete, but very rarely used, being held in reserve. Another pump at Saltonstall is rather antiquated. There are a few miles of cement lined iron pipe, principally in the higher levels. Otherwise the equipment may be classed as fairly modern and efficient.

Pumping Stations

There are two pumping stations at Whitneyville and one at Lake Saltonstall, the latter being known as the East Haven pumping station. One of the Whitneyville stations is built against the down-stream face of the dam across Mill river, which backs up the water of that stream to form Lake Whitney. * * * The spill-way is 150 feet wide and the dam gives about 30-foot fall. At this station a horizontal duplex double-acting Holyoke Deane pump is driven by water power developed by a 200 H. P. turbine, to which it is connected by rope drive. The pump has a capacity of about 5,000,000 gallons per twenty-four hours, and is so arranged that it may take its suction either directly from Lake Whitney or from the clear water basin of the recently completed filters. The former source is not now used, however, but the means of utilizing it are held ready for an emergency. The pump can force water either directly into the city mains, or to the Prospect Hill reservoir. The water power pump is run whenever there is sufficient water available in Lake Whitney to furnish the power in addition to the water needed to supply the filters, subject to the right of an adjacent manufacturing plant to take a certain amount of water for power purposes when the water back of the dam is above a certain elevation.

The pumping station building is a plain but substantial brick structure in good repair. Building and machinery are well kept.

The other pumping station at Whitneyville is located about 150 yards west of the one already described, and just north of the new filter beds. This station originally consisted of an engine room and a boiler room with walls of rubble stone, wooden roof beams and tin roof. A new engine room and a new boiler room were added, and the old boiler room was converted into a room for the storage of coal. The new buildings are of red brick with stone trimmings, and have steel roof trusses and slate roof. The engine room has hard wood floor. * * * There are three 90 H. P. horizontal return tubular boilers, built in 1895 by the H. B. Bigelow Company of New Haven. They are in good condition. Coal is weighed in wheelbarrows on platform scales and is hand-fired. There are no superheaters. There is an automatic damper draft regulator (Locke Bros., Salem, Mass.), actuated by pressure on discharge main of pumps. A boiler feed pump, an injector, and a work-bench and vise, with hand tools, complete the boiler room equipment. In the main engine room is a 10,000,000 gallon horizontal duplex compound condensing high-duty Worthington pumping engine equipped with service condensers and with direct connected water plungers for pumping to accumulator ram.

The other auxiliaries, all of which are independent, include two air pumps, one jacket pump, one air compressor, and a small vacuum pump for removing air from the suction air chamber. Like the water pump, this Worthington engine * * * can pump either direct to distributing mains or to Prospect Hill reservoir. It usually pumps to the reservoir and when the water power pump is running at the same time, the latter pumps into the distributing mains so as to avoid the water hammer which would interfere with the smooth working of the pumps if they both pumped into the same mains.

The Worthington pump appeared to be in first class condition and was running unusually smoothly for a pump of its size and type. In the old engine room there is a 6,500,000 gallon horizontal gear crank and flywheel steam pump, built in 1870 by the Yale Iron Works, successor to the M. & T. Sault Company, New Haven. There are one steam cylinder and two double acting pump cylinders. This engine * * * is of a very unique and remarkably cumbersome design. It was not run in 1905 except for three or four hours on one occasion, while a new set of valves was being put into the Worthington engine. While antiquated and inefficient, it is kept in good order and ready to run in case of emergency, being turned over by bar several times a week.

The pumping station at Lake Saltonstall, known as the East Haven pumping station, is a substantial building of red brick with stone trimmings. There are two engine rooms and a boiler room. The north engine room, built for the new D'Auria pump, has steel roof trusses. The whole building is roofed with gravel. There are three 100 H. P. Scotch marine boilers, hand-fired. Coal is wheeled from outside over platform scales. There are no superheaters, but there is a re-heater set on a by-pass in the flue, which uses the heat in the flue gases to re-heat the steam in its passage from the high to the low pressure cylinders of the D'Auria pump. This re-heater is said to be quite efficient. In the old engine room adjacent to the boiler room, is a horizontal compound condensing duplex low-duty Worthington pumping engine * * * which is rated at 6,000,000 gallons, but which often runs at 7,500,000 gallons. This pump, which has direct connected jet condenser and air pumps, was installed in 1882, and is still in good condition. The new engine-room houses a 10,000,000 gallon horizontal duplex direct-acting high-duty pumping engine, installed in 1905. The service condensers are set on discharge pipe, and there are independent air and vacuum pumps.

Both pumps at East Haven station pump into a standpipe about 800 feet distant; the Worthington through a 20-inch pipe, and the D'Auria through a 24-inch pipe. From the standpipe, in which the water stands at an average elevation of 162 feet above city datum, the water flows by gravity through a 24-inch pipe to the East Haven distributing reservoir, in which the water is kept at an average elevation of 142 feet. All of the pumping station buildings and all of their equipment are kept in first class order, and their appearance, as well as the results obtained in station duty, gives evidence of careful and efficient operation.

Filters.

The recently completed sand filtration plant consists of twelve beds, each 80 by 180 feet, arranged in two rows of six beds each along either side of a central operating gallery. In this gallery are placed all the pipes, valves, and the meters required for the operation and regulation of the filters. Above the gallery a second story is provided, in which are located the offices and laboratory of the superintendent of the filters. The filter plant has a number of novel and interesting features, and is described at considerable length in "Engineering Records" for March 5-12, 1904.

The site, which for various reasons had to be chosen for the filters, was not a desirable one from the standpoint of ease of construction. The ground sloped towards the northeast so sharply as to necessitate heavy grading, and the filter had to be built partly in excavation and partly in embankment. The material encountered was not uniform, and there were a number of springs which had to be drained. The excavation was begun in August, 1902, and the earth in the embankment was allowed to settle for a year to insure proper foundations for the filter. The side walls of the filters are of concrete up to the ground line, and brick from there to the eaves, being carried up above the ground high enough to give room for windows, thus avoiding the necessity for electric lighting. The floor, columns, and roof are of reinforced concrete. The floor is of the inverted groined arch type, while the roof is of slab and girder construction, and is covered with two feet of loam and turfed. To the north of the filters near the steam pumping station, there is a clear water basin of a net available capacity of about half a million gallons. The filters are rated at 1,200,000 gallons per day per bed, which, after allowing one bed idle in process of cleaning, and another idle to receive washed sand from the bed which is being cleaned, would make the net safe capacity of the filters about 12,000,000 gallons per twenty-four hours. They can be run, however, for short periods and under favorable conditions at a considerably greater rate, probably as high as 15,000,000 gallons per 24 hours. The entire plant is well designed and built, and its equipment is first class in every respect. Daily analyses are made of raw water and effluent, and these show that since it was first put in operation, the efficiency of the filter plant has been unusually high.

H 120. Is it in good condition?

Chicago. Most of it is.

Cleveland. Yes.

Syracuse. Generally speaking, the plant is in very good condition. Most of it is comparatively new.

Indianapolis. Yes, as a rule.

New Haven. Yes.

H 121. Will it be necessary to make extensive repairs or alterations in the near future?

Chicago. Yes. (See H 2.)

Cleveland. Before the two west side tunnels, at present out of service on account of the pollution of water at west side crib, can be used again, they will have to be extended about four miles from shore, and a new intake must be provided, and new aqueducts and pump wells must be built at Division street station in order to develop the full capacity of the tunnels. Facilities for storing and handling coal should be provided at that station before it is put into regular service again. The second high service system is now under construction for the supply of recently developed territory on high ground to the southeast, and at present mostly outside of the city. This system will comprise two 2,000,000 gallon pumps at Fairmount station, a 16-inch main 19,000 feet long from Fairmount to a 200,000 gallon water tower 135 feet above ground, which will bring its flow-line 570 feet above city datum.

Sryacuse. No. The proposed new conduit line and reservoir referred to in answer to H 5 will probably entail an expenditure of over a million dollars, but these may be classed as extensions rather than as alterations and repairs.

Indianapolis. No.

New Haven. No extensive repairs or alterations necessary. The contemplated extensions and improvements, either in progress or under way, may be enumerated as follows:

(1) A new concrete dam on Sargent river just above Lake Dawson to increase storage on that watershed. This dam is about 60 per cent. finished. Contract calls for its completion by December 1, 1906, but it will be delayed.

(2) Replacing the 27-inch cement-lined wrought iron pipe from Lake Dawson to New Haven by a 48-inch cast iron main; also laying a 30-inch by-pass around Lake Dawson to the new dam so that the supplies from Sargent river and West river may be separate, and either may be used as desired.

(3) A dam on West river between Lakes Dawson and Bethany. Not yet begun.

(4) The diversion of Wepauwaug river by tunnel and open canal into Lake Maltby No. 3. This will more than double the supply from the Maltby lakes.

(5) The diversion of Farm river into Lake Saltonstall by tunnel and open canal. The tunnel is nearly completed.

(6) The diversion of some of the swamp drainage from the Saltonstall shed, and the draining of the remaining swamps on that shed.

(7) A standpipe on Mill Rock into which the Lake Whitney filtered water may be pumped to supply Prospect Hill and other high points now supplied from Lake Wintergreen. When this standpipe has been built, Lake Wintergreen will be emptied and cleaned and the area of its watershed will be increased. An additional small pump will be required at Whitneyville station to pump into the standpipe.

(8) Certain water supplies are owned in Wallingford and Prospect, Conn., which will eventually, by diversion of streams, be brought down to supply New Haven and other neighboring towns.

II 132. Is the plant kept in a clean and neat condition?

Chicago. As a rule, yes.

Cleveland, Syracuse, Indianapolis. Yes.

New Haven. Yes, very.

II 133. Are the works adequately ventilated?

Chicago, Cleveland, Indianapolis, New Haven. Yes.

Syracuse. No pumping works.

II 134. Are the pits, shafts, and machinery properly guarded?

Chicago, Cleveland, Indianapolis, New Haven. Yes.

Syracuse. No pits, shafts and machinery.

II 135. Are the offices for payment, complaints, and other business conveniently located?

Chicago and *Cleveland.* In the city hall near the business center of the city.

Syracuse. No. Offices of city treasurer who collects frontage tax and the commissioner of public works and deputy city engineer, who have to do with the extension of mains, are in city hall. General offices of bureau of water are in another building about three blocks distant, and office of water works repair shop near the latter.

Indianapolis. Yes, on Monument Circle in center of city.

New Haven. Yes.

II 136. Were consumers' complaints promptly and efficiently attended to?

Chicago. Complaints received prompt and courteous attention. All cannot, of course, be given what they ask.

Cleveland. So far as could be learned by observation and inquiry, yes.

Syracuse. Apparently they were.

Indianapolis. As well as could be determined by much observation and inquiry, yes.

New Haven. Complaints apparently received prompt attention.

II 137. Describe office system of handling complaints.

Chicago. Each large department or division has a complaint clerk. In division of water pipe extension, for example, complaints as to leaks are transmitted to district foremen. Complaints as to lack of pressure, referred to plumbing inspector. If lack of pressure causes general complaint, referred to pumping station division. Similar systems in other offices. There is also a bureau of complaints in city hall, but this handles all city complaints, and very few complaints are referred from that bureau to bureau of water, to which most complaints as to water service are made directly.

Cleveland. Complaints of leaks, stoppage of water, and insufficient pressure are received in office of engineering department. Each complaint is recorded in complaint book, and written order is sent to general foreman of repairs, who makes written daily reports of all repairs or investigations made by his force. All repair foremen telephone to main office before going home at night to see if there are any special repairs requiring them to work overtime, so that all necessary and emergency work is done, if possible, on day on which complaint is made. Complaints as to bills are referred first to complaint and billing department, and if necessary, from this department to the superintendent.

Syracuse. On complaint of amount of meter bills, inspector is sent to look for leaks, and if necessary, to test meter. On complaints of lack of pressure, an investigation is made. Lack of pressure, except when due to the height or high location of buildings, is usually due to some local obstruction in service pipes, or to neighboring leaks or breaks, as the city pressure is remarkably uniform at all times for any given elevation. No complaint book is kept. Each complaint is supposed to be investigated by the division to which it belongs.

Indianapolis. Complaints made at windows are referred by the clerk receiving them to the proper departments, one of the company's officers—president, vice-president, or secretary—finally hearing any complaints which subordinates have not been able to settle satisfactorily. The rule of the office is to bring the higher officers into as close touch as possible with consumer. Very little friction observed in offices.

New Haven. The desk of the secretary of the company commands view of the entire main office. All complaints that cannot be promptly adjusted by office force go at once to him, and he then directs their further investigation and settlement.

H 137a. How are leak complaints attended to at night?

Chicago. All offices in city hall, except those of fire and police department are closed at night. Complaint would have to be made to fire department office, which would try to telephone it to district foreman.

Cleveland. Night turn-off man and night watchman at main office take care of all ordinary complaints. In case of emergency, repair foremen are notified.

Syracuse. One man on duty all night at water works office. Two men with an emergency wagon are on duty all night at water works repair shop to give prompt attention to leaks.

Indianapolis. Man kept constantly on duty with telephone connections to all departments. Automobiles and horses and vehicles in stables at office.

New Haven. By superintendent's force. Two men on duty all night with horse hitched to wagon.

H 138. Is there a system of badging or uniforming employes so that they may be known to the public?

Chicago. Heads of departments, foremen, inspectors, and others authorized to meet public officially have badges.

Cleveland. All meter readers, or inspectors, or others whose duties may require them to enter premises of consumers must wear badges.

Syracuse. There are no uniforms. Inspectors and meter readers wear badges.

Indianapolis. Inspectors and street men have badges.

New Haven. Inspectors wear badges.

H 139. Are the general morale and discipline of the employes good, bad, or indifferent?

Chicago. Apparently fairly good.

Cleveland and Syracuse. Apparently good.

Indianapolis and New Haven. Apparently very good.

H 140. Are the employes who meet the public polite and attentive?

Chicago, Syracuse, Indianapolis, New Haven. Yes.

Cleveland. So far as could be learned from observation, yes.

H 141. Are they neatly dressed?

In the case of all five of the plants, yes.

H 142. Do the various departments work in harmony? Is there friction or jealousy? Does one department shirk work, leaving it to be done by others?

Chicago. Not much friction or jealousy observed. No shirking observed.

Cleveland. Apparently the various departments are fairly harmonious.

Syracuse. Very little friction, jealousy or shirking observed.

Indianapolis. There appears to be harmony between the various departments. No evidence of friction, jealousy or shirking were noted.

New Haven. Apparently harmonious.

H 143. Is there an adequate system of telephones?

Chicago. No. Not all of the district foremen have resident phones as yet.

Cleveland. Yes. All offices and each pumping station, crib and reservoir; each head of division, meter foreman and two repair foremen have telephones.

Syracuse. Yes. Telephones at reservoir and at offices of commissioner of public works, city engineer, and superintendent of water works, and at repair shop.

Indianapolis. Yes. In addition to public service there is a private line between all pumping stations and filter plant. Repair foremen and all heads of departments have residence phones.

New Haven. Yes. Company has telephones in ten different places, as follows: Main office, superintendent's office, Whitneyville pumping station, Satlonstall pumping station, chief pumping engineer's residence, superintendent's residence, superintendent of West river section, including Lakes Chamberlain and Bethany, superintendent of Lake Dawson, patrolman Lake Saltonstall, and superintendent of filter plant.

H 144. Are the works and offices properly watched at night?

Chicago. The works, yes. Offices are closed at night. There are policemen in the city hall, but not, however, to attend to water complaints.

Cleveland, Syracuse, Indianapolis, New Haven. Yes.

H 145. Are employees generally permitted to run to fires, or is someone appointed to go?

Chicago and *Cleveland.* No employee of bureau of water attends fires.

Syracuse. Employees are not supposed to go to fires.

Indianapolis. There is a regular fire attendant employed by the company, as provided in contract with city, ready with vehicle to respond to all alarms.

According to the report of this fire attendant, Frank Bihlmier (Exhibit 9), dated April 14, 1906, the fires from January 1, 1905, to January 1, 1906, were as follows:

Total number of fires	519
Total time fire pressure carried	187 hours 31 mins.
Total number of cistern connections used	9
Total number of open butts used	2
Total number of times chemical used	47
Total number engine streams used	46
Total number of hydrant streams used	432

New Haven. Neither.

H 146. Is there any system of inspection to prevent workmen of other companies or city departments from injuring the underground structures.

Chicago. Yes. The superintendent of streets issues the necessary permit to open the streets, and inspectors of the street department keep track of the work, and of underground structures encountered, notifying the water department when necessary, which then takes steps to protect its pipes.

Cleveland. Inspectors from street department watch all work done in streets by companies or contractors. These inspectors are supposed to look out for danger to underground structures and to report same.

Syracuse. The commissioner of public works has inspectors on all work done in streets by private corporations or by contractors with the city.

Indianapolis. Yes, the foreman in each department sees that proper inspections are made.

New Haven. Company's inspectors look out for and report any danger from such injury.

H 147. Was there a drafting room maintained?

Chicago. Yes.

Cleveland. Yes, and the equipment for making and preserving maps and records was unusually good.

Syracuse. None in connection with the bureau of water.

Indianapolis. Yes.

New Haven. Yes. In the office of the engineer for the company, located in same building with main offices.

H 148. What system was in vogue to take care of the tools distributed to employees?

Chicago. District foreman issues tools to sub-foremen as required. Transient day laborers furnish their own shovels.

Cleveland. Tools issued and charged to each foreman by a storekeeper. Laborers furnish their own shovels.

Syracuse. City furnishes shovels as well as other tools to employees. Tools are issued to and charged up against foremen, and are checked back daily, except on construction work or other work lasting more than a day.

Indianapolis. All tools belonging to the company are marked and foremen are relied upon to look after tools. Transient day laborers are required to furnish their own shovels, and company furnishes picks. The company furnishes all tools used by its regular men.

New Haven. Foreman on the job is held responsible for them.

H 149. Were the different classes of workmen equipped with proper tools? Were the tools kept in order?

Chicago, Cleveland. As a rule, yes.

Syracuse, Indianapolis. Yes.

New Haven. Apparently yes.

H 150. With what promptness were orders to turn on water attended to?

Chicago. Under laws in force in 1905, the plumber employed by consumer applied to permit department, bureau of water, for permit to lay service pipe, and to street department for permit to open street, and deposited with comptroller sufficient funds to cover cost of replacing street. The tap was then put in by tapper from permit department, bureau of water, and the service pipe and tap were inspected by inspector from same department. The tapper, or plumber, then turned on water as far as stop-cock at curb. Plumber turned on water at stop-cock to premises. House plumbing was inspected by inspector from health department, and rating slip made out by inspector from bureau of water. One or two days' notice usually required before main would be tapped.

After that, the work of laying service pipes and turning on water would be in the hands of the plumber, employed by the consumer. In case water had been turned off for leaks, non-payment, or other causes, from one to twenty-four hours would usually be required to turn it on again.

Cleveland. Usually either the same day or the next one.

Syracuse. The turn-on man takes his orders from book at 8 A. M. and 1 P. M. daily, or oftener if his work will permit. Each morning's orders are thus attended to, as a rule, not later than the same afternoon, and the afternoon orders not later than the next forenoon.

Indianapolis. Usually the same day.

New Haven. Apparently, they were promptly attended to.

H 151. Are service-pipes run to every lot whether built upon or not prior to street paving or repaving? If so, how many of these dead services are now in existence?

Chicago. If services are not in at the time when it is proposed to pave the street, a separate assessment for cost of service pipes is levied on property benefited. The work is done, assessment confirmed, and cost of pavement and of putting in service-pipe is charged to property owner and collected. There are about 120,000 service connections which pay no water rates. There is no means of knowing how many of these are the dead services referred to.

Cleveland. Yes. Property owners are compelled to lay service-pipes to lots not already supplied. According to the books, there are 13,635 of these services which are supposed to be dead.

Syracuse. Yes. On December 31, 1905, there were 2,726 of these dead services in existence. City pays for all service pipes except those laid for special fire protection. In case consumer requires a new service pipe after pavement is laid, he pays the cost of repaving the street over his trench.

Indianapolis. No. Taps are made upon application of property owner, and agreement by him to put in the service pipe.

New Haven. City requires all services to be laid to curb by property owner in advance of pavement. Writer not informed as to number of these dead services.

H 152. Are records kept of services by date installed, so that as a service grows old, an inspection may be made at intervals of years to determine when renewals should take place and insure such renewals before most of the services have begun to give trouble?

Chicago. Records are kept of date installed, but no services are dug up for inspection unless actually thought to be leaking.

Cleveland. Records are kept by date, but services are not dug up for inspection unless there is good reason to think that they need repairs or renewals.

Syracuse, New Haven. Records of services are kept by date, but services are not dug up for inspection unless there is some reason to think they are out of order.

Indianapolis. Records kept by date, but services are not dug up unless necessary.

New Haven. EXHIBIT 11.

Notice to Consumer of Water.

Office of New Haven Water Company.

.... 190 .

Dear Sir: The city authorities inform us that they are about to pave the street in front of the premises .... We call your attention to the desirability of your making an immediate examination of your water service pipe, so that, if it is seriously corroded, you may repair or replace it before the paving begins. After the paving is completed, it will be very difficult to get a permit for opening the street and thus disturbing the new pavement, and it is to your interest that all connections with our main be at once placed in good condition. In all cases your service should be controlled by a curb box.

Yours respectfully,
NEW HAVEN WATER COMPANY.

H 153. Are there regulations in force regarding the entrance of employees to houses? If so, attach a copy.

Chicago. Yes. Section 2398 of revised city code (1905) Exhibit 15, as follows:

"Section 2398, Power of Entry—Penalty. The officers of the department of public works, and any and every person delegated or authorized by the commissioner of public works for such purposes, shall have free access to all and every part of any building, structure, or premises to which water is supplied from the Chicago water works system, for the purpose of examining the water pipes, taps, and fixtures therein or thereon, whenever such examination is deemed necessary or advisable in order to ascertain whether the provisions of this chapter are being complied with. Any person in possession, charge, or control of any such building, structure, or premises, into which any such officer or person shall desire to make entry or have access for the purpose herein specified, who shall refuse to permit such entry or access, or who shall do, or cause to be done, any act or thing for the purpose of preventing such entry or access, shall be fined not less than $10.00 nor more than $100.00 for each offense."

Cleveland. Yes. Rule 34, page 17, of Ordinances, Rules, and Regulations, etc., December 24, 1896 (Exhibit 16):

"The superintendent and other employees in the water works division of the department of public works shall have free access at all reasonable hours of the day to all parts of any premises to which water is supplied."

Syracuse. Yes. Exhibit 10, Rules, regulations, and rates, bureau of water, city of Syracuse, January 1, 1902, page 19:

"INSPECTORS MAY ENTER PREMISES. Employees of the bureau of water, upon presentation of badge, may enter upon any premises where city water is being supplied or upon any premises when application is made for permission to connect plumbing with the water pipes, for the purpose of inspecting all plumbing and fixtures of the water service, and all work in connection with such service.

Page 32, ACCESS TO METER. The owner and tenant shall provide ready and convenient access to the meter so that it may be frequently read and examined by the agents of the bureau of water."

Indianapolis. Yes. Rule 6 of rules and regulations of the company. (Exhibit 14.) All persons taking water shall keep their pipes and fixtures in good repair, subject at all times to the inspection of the water company or its agents, and shall prevent any unnecessary waste of water. It is expressly stipulated that no claim shall be made against the water company for damage due to the breaking of any service cock or service pipe.

New Haven. Yes. Last sentence of annual water rates of the New Haven Water company, May 1, 1902 (Ex. 8). Inspectors of the company must have free access at all proper times to any part of the premises covered by the service.

H 154. Does any one inspect the work done by employees in consumers' houses?

Chicago. No work is done by employees in consumers' houses. All inside work done by licensed plumbers except setting of meters by employees of water division.

Cleveland. The only work done by employees in consumers' houses is the setting and reading of meters. This is supervised by the meter foreman.

Syracuse. Employees do not work in consumers' houses except to occasionally reset a broken or frozen meter. Work not inspected.

Indianapolis. Employees do no work in consumers' houses except to inspect plumbing and fixtures.

New Haven. Employees do no work in consumers' houses except the setting of meters.

H 155. If so, is this inspection general, or does it include every job?

Chicago. Plumbing work is inspected in each case by health department.

Cleveland. It usually includes every job of meter setting.

Syracuse. No regular inspection.

Indianapolis. The inspection includes every job.

New Haven. ———.

H 156. How often are consumers' premises and fixtures inspected either for re-rating or to check waste?

Chicago. As often as possible with force available. There are 35 inspectors in 35 wards, who are able to cover their territory in from two to three years.

Cleveland. Such inspections have not been regularly made for some time. The entire city was inspected for re-rating in 1895. From time to time since then there have been occasional inspections in certain districts.

Syracuse. Not at all, unless for some special reason. There has been no general inspection for about ten years. An inspection for waste on unmetered services was made during spring of 1905. At that time water was drawn off from Syracuse level of Erie canal for repairs to canal bridges, and some large firms that had been getting their supply from the canal were thus compelled to take their supply from the city. This taxed the capacity of the conduit line, and necessitated strict economy of water.

Indianapolis. As nearly as possible, once a year.

New Haven. Probably twice a year.

H 157. How often are meters tested?

Chicago. Whenever requested by consumer or deemed necessary by meter division.

Cleveland. Meters on large consumers are tested about once in three months. The department endeavors to test the various sizes of meters when they have registered respectively the following quantities of water:

⅝-inch, 200,000 cubic feet.
¾-inch, 1,000,000 cubic feet.
1-inch, 2,000,000 cubic feet.
1½-inch, 5,000,000 cubic feet.
2-inch, 10,000,000 cubic feet.
3-inch, 20,000,000 cubic feet.
4-inch 40,000,000 cubic feet.

Syracuse. Not tested unless there is reason to suspect some defect.

Indianapolis. Whenever the consumer requests it or the company deems it advisable.

New Haven. When any variation in consumption is noticed, or upon request of consumer.

ADDITIONAL MATTERS

The following questions, Nos. H 158 to H 166, inclusive, were prepared by Doctor Edward W. Bemis, a member of the commission on municipal ownership and operation, and have been added to the schedule since the schedules were printed.

The following extract from the supplemental letter of instructions, signed by Frank J. Goodnow, Chairman, and directed "to the experts," and dated February 27, 1906, should be considered in connection with these inquiries.

"The schedules provided cover all points of importance that the committee was able to suggest, and doubtless, if exhaustively answered, they cover sufficient points; but if you, in the course of your investigation, become convinced that other information is obtainable and desirable, you should submit to the Committee of Five the question of the advisability of including it in your report. The committee desires all the obtainable information in reference to municipally operated plants.

It has decided that what a customer pays for a unit of service when rendered by a company operated plant is to be taken as the financial measure of comparison with municipally operated plants, except consideration shall be given to payments made or free service rendered to the city, and in this connection the committee desires to impress on you the importance of determining the real cost to the consumer of a comparable "unit of service." This has to do with many things, and concerns practically all the experts retained."

H 158. The fire insurance rates; any recent changes in the same, and any report made by the underwriters within two or three years upon the fire insurance protection?

Chicago. Exhibit 5, being an extract from report on the city of Chicago, Illinois, issued by the National Board of Underwriters, Committee of Twenty, December, 1905 (22 pages, large). Attached to the original report by Mr. Maury (see H 85).

COST OF A COMPARABLE UNIT OF SERVICE.

This cost should fairly include a number of items, some of which cannot be accurately determined. The principal items may be enumerated as follows:

A. The rates paid for water and fire protection.

B. Extra insurance premiums paid on account of water works deficiencies, as well as the loss, not covered by insurance, resulting from such deficiencies. If lack of pressure causes extra expense for steamers and other fire apparatus, this extra expense should also be included.

C. Amount paid out by consumers in addition to water rates for water from other sources, provided these amounts are so paid because the city supply is in any way undesirable.

D. Value of damages caused by sickness or death as a result of inferior quality of the city water.

E. Value of damages caused by interruption of supply, or by its failure owing to lack of pressure to reach the upper floors of houses remote from the pumping stations or on the higher levels of the city.

F. Value of damages suffered by citizens as a result of their inability to secure extensions of mains when and where needed.

G. In the case of a municipal plant operated at a loss the amount in addition to water rates paid by the citizens in the form of taxes or payments for other purposes, plus the amount of taxes which would have to be paid on the plant if it were privately owned. Or in the case of a municipal plant operated at a profit, the credit which should be given for such part of this profit as might be available for the general fund after deducting the two amounts above referred to.

A.

The water rates are found in Section 17, pp. 3-4 of Exhibit H (not reproduced here).

It should be noted that Section 17 provides that the frontage rates shall be assessed against every building fronting on a street in which there is a water main regardless of whether water is taken or not, and that the minimum meter rate is the frontage rate. Upon notice from property owner that his premises are vacant and payment of $1 for turning off, water will be turned off, and rebate of 75 per cent. of assessed rates allowed, provided the turn-off period exceeds 60 days.

The city pays no hydrant rentals to the water department.

B.

The extra insurance premiums paid on account of water works deficiencies were estimated for the writer by an engineer employed by the insurance companies to report on the fire protection features of water works plants in cities in this section of the United States at $1,250,000 for the year 1905. In making this estimate the mercantile schedule was used as a guide.

The writer has no means of determining the amount of loss not covered by insurance sustained by citizens of Chicago as a result of lack of water works fire protection.

The total appropriations for the fire department for the year 1905 amounted to $2,345,858.94. The writer has no means of knowing how much of this appropriation was rendered necessary by the unusually low hydrant pressures.

C.

(See also H 166.) The amount paid in addition to water rates by the citizens of Chicago for drinking water in 1905 is estimated by the writer to have been not less than $650,000. This estimate is based on statements of yearly sales furnished by some of the principal purveyors of table waters in the city and does not include any artificially medicated waters, nor Apollinaris, nor other natural bottled waters sold for medicinal purposes.

D.

The writer of this report is unable to make any estimate of the value of damages caused by sickness or death as the result of any inferiority in quality of the city supply.

E.

The supply to the city as a whole was not at any time interrupted during 1905. Many people were at times deprived of the use of water as a result of lack of pressure.

The writer has no means of estimating the value of the damages sustained by reason of this deprivation of supply.

F.

There is no way of determining the value of damages suffered by the citizens as a result of their inability to secure extensions when and where needed.

G.

The amounts in addition to water rates paid out for water service by the citizens of Chicago in the form of taxes for other purposes should properly include the following items:

(1) Interest on the unreturned balances of the cost of any portions of the plant that may have been built by any form of assessment levied against the property owners or out of the general fund. The writer is unable to state even approximately the amount of this item.

(2) (See answer to H 50.) Interest and taxes on such proportion of the cost of the sanitary canal and of the system of intercepting sewers as may be fairly considered to have been incurred for the purpose of purifying the city's water supply. Also a similar proportion of the operating expenses, including proper allowances for depreciation and maintenance of the said canal and sewers.

(See also answers to H 50 and H 60.) The cost of the sanitary canal up to January 1, 1906, was $49,719,957.54 (as set out in Exhibit 11, not reproduced here), and there has been in the neighborhood of $5,000,000 expended on the intercepting sewers, making a total of a little under $55,000,000 for the two. Practically none of the expense incurred in the construction of the sanitary canal was due to any consideration of the need of a deep water-way. It was necessary to excavate a channel of a certain size in order to fulfill the legal requirement that its discharge should be 200,000 cubic feet per minute for each million inhabitants of the sanitary district. The cross-section chosen for the canal, which happens to give the depth required for the water-way, was more economical to excavate than a shallow one would have been. The only other two reasons for the construction of the canal were the purification of the water supply and the cleansing of the Chicago river, which was foul as a result of the sewage discharged into it. The river could have been cleansed by pumping water through tunnels from the lake into its upper reaches, as is done in Milwaukee. This could have been accomplished at much smaller cost than the construction of the canal. The intercepting sewers would not then have been required. The writer believes that between 80 and 90 per cent. of the cost of these two works is fairly chargeable to the purification of Chicago's water supply.

Assuming $45,000,000 as the expense incurred for this purpose, the interest charge at 4 per cent. would amount to $1,800,000 per annum.

The writer is unable to state what would be a proper allowance for taxes and operating expenses on the above proportions of these two works.

The taxes that would have been paid on the Chicago water works plant, assuming that it was owned and operated by a private corporation, have been estimated by the expert accountants for the National Civic Federation at about $420,360.

The same accountants have also estimated that a fair annual charge for fire insurance, boiler insurance and employers' liability insurance for the water works plant would be $60,285.

Cleveland. (H 158). A report on city of Cleveland published in April, 1904, by Cleveland inspection bureau, and giving description of water works, fire department and other features affecting the fire hazards of the city, with maps, is attached to original of engineer's report as Exhibit 18 (not reproduced here).

Report of Committee of Twenty, National Board of Fire Underwriters, published in July, 1906, is attached to original of engineer's report as Exhibit 19 (not reproduced here). It covers 36 large printed pages.

The Cleveland key rate under the mercantile schedule is 33 cents instead of the minimum of 25 cents. Mr. C. H. Patton, manager Cleveland inspection bureau, states that of the difference of 8 cents one-half, or 4 cents, would be properly chargeable to water works deficiencies, the remaining 4 cents being added for fire department and structural deficiencies and for conflagration hazards. Mr. Patton estimates roughly that the total fire insurance premiums paid in Cleveland in 1905 was $1,850,000, and that of these premiums about $1,200,000 were on property whose rate was affected by the 4 cents increase chargeable to water works deficiencies, and that the total amount by which the premiums were so increased was about $48,000.

COST OF A COMPARABLE UNIT OF SERVICE.

Letters A to G correspond to those used in Chicago H 158.

A.

The water rates will be found in Exhibit 16 and Exhibit 17 (not reproduced here). See also H 79 and H 80.

The rates given in Exhibit 17 are intended to supersede those given in Exhibit 16 and are becoming effective in each case from the date of the setting of meter. Meters are being set as fast as possible, 68.4 per cent. of all active services having been metered up to the end of 1905.

The city pays no hydrant rentals to the water department.

B.

The extra insurance premiums paid on account of water works deficiencies were estimated for the writer by Mr. H. C. Patton, manager Cleveland inspection bureau, to have been $48,000 in 1905.

The writer has no means of determining the loss not covered by insurance sustained by the citizens of Cleveland as a result of any lack of water works fire protection. Fire steamers are a part of the fire department equipment and are generally used when water is drawn at fires. There is also a separate fire service system, consisting of a system of high pressure mains laid in the business district and supplied by two fire tugs, which are also equipped with hose for fighting fires close to or on the lake.

For details of this high pressure fire service system see pp. 11-12 of Exhibit 18 (Fire underwriters' report) and pp. 8-10, Exhibit 19 (maps accompanying fire underwriters' report). (Not reproduced here.)

The cost of the high pressure fire equipment and of its maintenance and operation was not paid by the water works division.

The writer has no means of determining what proportion of the expense of all this equipment should be fairly charged to the deficiencies in the fire protection afforded by the water works plant.

C.

The amount paid in addition to water rates by the citizens of Cleveland for drinking water in 1905 is estimated by the writer to have been $80,000. This estimate is based on statements of yearly sales furnished by some of the principal purveyors of table waters in the city and does not include any artificially medicated waters, nor Apollinaris, nor other natural bottled waters sold for medicinal purposes.

D.

The writer of this report is unable to make any estimate of the value of damages caused by sickness or death as the result of any inferiority in quality of the city supply.

E.

The supply of the city as a whole was not at any time interrupted during 1905. A few people had at times insufficient pressure.

The writer has no means of estimating the value of the damages sustained by reason of this deprivation of supply.

F.

There is no way of determining the value of damages suffered by the citizens as a result of their inability to secure extensions when and where needed. Where such extensions offered what might be considered a good return on the investment they appear to have been made with reasonable promptness.

G.

The amounts in addition to water rates and to the other charges already referred to in paragraphs B to F, just preceding, paid out for water service by the citizens of Cleveland should properly include interest, taxes and other fixed charges on some proportion of the $1,500,000 already spent in the construction of the uncompleted intercepting sewers. This expense was incurred partly to purify the water supply and partly to purify the Cuyahoga river. While it is difficult to apportion the expense accurately between the two the writer estimates that about 80 per cent., or $1,200,000 of the cost of the intercepting sewers would be fairly chargeable to the purification of the city's water supply.

The interest and depreciation at 6 per cent. on $1,200,000 would be $72,000. Taxes at $31.70 per $1,000 on 60 per cent. of the valuation would be $22,824.

The taxes that would have to be paid on the Cleveland water works plant, assuming that it was owned and operated by a private corporation, have been estimated by the expert accountants for the National Civic Federation at $225,355.

The same accountants have also estimated that a fair annual charge for fire insurance, boiler insurance and employer's liability insurance for the water works plant would be $15,153.64.

Syracuse. (H 158). The basis rate in Syracuse on mercantile buildings is 30 cents. The basis rate for a "model city" from a fire insurance standpoint would be 25 cents; the increase of 5 cents having been made on account of deficiencies in fire alarm telegraph system. Up to September, 1906, there had been no increase in insurance rates on account of lack of water works fire protection.

Report on the city of Syracuse, dated December, 1904, by Committee of Twenty of National Board of Fire Underwriters, is attached to the original of engineer's report, as Exhibit 11. It covers 29 large printed pages. (Not reproduced here.)

COST OF A COMPARABLE UNIT OF SERVICE.

Letters A to G have the same meaning as under Chicago H 158.

A

The water rates are given in the rate sheet, Exhibit 8 (not reproduced here). It should be noted that the legislative act which became a law June 6, 1895, * * * provides for an annual frontage tax of 5 cents per lineal foot of frontage on each side of the main, subject to certain rebates to water takers as specified in said law. The amount paid by citizens of Syracuse in frontage tax and fees in 1905 was $17,697.69.

The city pays no hydrant rentals to the bureau of water.

B.

There were no extra insurance premiums paid on account of water works deficiencies in 1905.

The writer has no means of determining the amount of loss not covered by insurance sustained by citizens of Syracuse as a result of lack of water works fire protection. Fire steamers are a part of the regular fire department equipment, but good pressures and discharges may be obtained directly from most of the hydrants on the lower levels of the city without the aid of steamers.

C.

So far as the writer was able to learn, except for Apollinaris and artificially carbonated waters or natural waters sold for medicinal purposes, there was practically no sale of drinking water other than that supplied by the city.

D.

The water supplied by the city of Syracuse in 1905 was, in the writer's opinion, of excellent sanitary character.

E.

The supply to the city as a whole was at no time interrupted. A few persons living in the higher portions of the city suffered inconvenience from lack of pressure, and a still smaller number were occasionally without water for some hours at a time.

The writer has no means of estimating the value of the damages sustained by reason of the deprivation of supply in these rare instances.

F.

There is no means of determining the value of the damages suffered by the citizens as a result of their inability to secure extensions when and where needed. Any such damages were doubtless comparatively small.

G.

So far as the writer was able to learn there were apart from the frontage tax already mentioned practically no payments in addition to water rates in the form of taxes for other purposes.

The bureau of water paid out of earnings taxes on property outside the city limits, but the additional taxes which would have been paid in 1905 on the property of the Syracuse water works, had it been owned by a private company, are estimated by the expert accountants for the Federation at $56,530.

The same expert accountants estimate that a fair charge for accident insurance in 1905 would be $1,250.

The bureau of water carries fire insurance so that no further charge is necessary under that heading.

Indianapolis. (H 158.) A 5 per cent. increase on buildings in congested district for alleged water works deficiencies and 5 per cent. for alleged fire department deficiencies, in addition to 5 per cent. for unprotected vertical openings, and 5 per cent. for unprotected wall, door and window openings were added in 1904. No report was made by underwriters prior to the increases in rates nor until October, 1906.

Copy of report of committee on fire prevention, National Board of Fire Underwriters, October, 1906, is attached to the original of the engineer's report as Exhibit 16. (Not reproduced here.) It covers 28 large printed pages.

THE COST OF A COMPARABLE UNIT OF SERVICE.

The letters A to G, inclusive, correspond to those used in Chicago, H 158.

A.

The water rates are attached to the original of the engineer's report as Exhibit 14 (not reproduced here).

The city pays the company $45 per annum for each fire hydrant ordered by the city and agrees to take one hydrant for each

500 feet of main which the city may order the company to lay. The city also pays $45 per annum for each continuously flowing fountain.

B.

The extra cost to the citizens of Indianapolis as a result of the increase in insurance rates for alleged water works deficiencies is estimated by the local insurance inspector to have been $112,000 in 1905.

Without attempting to explain the intricacies of the Dean mercantile or other schedules which are supposed to be used by the insurance companies as a guide in fixing the basis rate in different cities, the writer must here, in fairness, express his opinion that the attitude of the insurance representatives in Indianapolis has not been consistent. This opinion was formed almost wholly from personal interviews with these representatives. Without going into the details of these interviews, in which a number of statements were made to the writer which showed a surprising lack of knowledge of the local conditions, the following facts may be stated:

The insurance representatives appear to have made no thorough systematic test of the fire protection efficiency of the water works plant prior to increasing the rates. The increase in insurance rates included specific charges for certain specified alleged deficiencies in water works. These included certain additions for lack of duplicate mains from pumps to the business center, and certain other additions for small size of certain mains in the congested district. As a matter of fact, there were two 24 inch mains leading to the business center from two separate and independent pumping stations. At one of these stations there were two sources of supply, in addition to about 1,500,000 gallons stored in reservoirs, as well as an emergency intake from the river. There were also at this station three pumping engines in separate engine rooms. Leading to the other station, was a large gravity conduit fed by the same sources of supply as at the first station, as well as a second emergency intake from the river. At the second station there were four pumps in three engine rooms.

Obviously these conditions offered better protection than if the two mains came from one pumping station, so that the specific charge for lack of duplicate mains does not appear to have been well founded in the first instance.

As the case now stands, however, a separate and entirely independent 36 inch main has, since the increase in the insurance rates went into effect, been laid to the center of the city, and a considerable amount of smaller pipe has been replaced by larger mains.

The insurance representatives admit that these improvements have been carried out, but no reduction in rates has been made or is contemplated on that account, partly, as stated by them, because the rates might not be high enough anyhow, and partly for the reason that, if the rates were lowered, they fear that the other improvements demanded might not be completed.

The writer of this report does not assume to know whether the insurance rates as a whole are too high or too low; but if certain charges are added by the insurance companies for certain specific deficiencies, and if, after those deficiencies are corrected, the specified charges are not removed, inconsistency would seem to be proven.

The writer has no means of determining the amount of loss not covered by insurance sustained by citizens of Indianapolis by reason of lack of water works fire protection.

Fire steamers are part of the Indianapolis fire department equipment. The report of fire attendant employed by Indianapolis Water company shows that about 9.6 per cent. of the total streams used at fires were engine streams, the remaining 90.4 per cent. of the streams being used under the hydrant pressure alone.

C.

A canvass of all the principal purveyors of table waters in Indianapolis showed that the total amount spent in 1905 by its citizens for drinking waters, not including artificially medicated waters, nor Apollinaris, nor waters sold for medicinal purposes, was about $10,000.

See H 159 and H 166.

D.

Interviews with members of the Indianapolis Board of Health as well as all that the writer was able to learn from other competent sources, corroborate the opinion that the water supplied in 1905 was of good sanitary character.

The president of the Board of Health stated that he had from time to time analyzed the water from about four thousand private wells in Indianapolis, and ordered closed 75 per cent. of all the wells that he had examined, but that the wells would soon be used again as there was no law by which the board could enforce these orders. The president and secretary of the board both stated that they had tried for a long time to get an ordinance compelling the closing of cesspools, and the putting in of connections to sewers, but that real estate men and property owners had always succeeded in defeating the ordinance. The city has a plumbing ordinance; but no plumbing inspector, and the Board of Health is said to have been unable to get one appointed, because of the opposition of the master plumbers, who fear favoritism in the purchase of supplies.

In view of the statements quoted above, it is the writer's opinion that a high typhoid fever death rate might naturally be anticipated, even with the purest possible city water supply. (See also H 61.)

E.

Except for the total time—about four hours altogether—during which the pressure dropped as a result of the four breaks in the mains mentioned in the answer to H 162, there was no interruption of the supply to the city. The normal pressure was sufficient to afford excellent service to the upper floors of residences anywhere within reach of the city's mains, except, perhaps, during the sprinkling season to a very few houses in the high land in Irvington, for which remote and recently annexed suburb the company is now about to install a separate high service pumping plant. See also H 162.

F.

There is no means of ascertaining definitely what damages were suffered as the result of failure to obtain extensions of mains when desired. As previously stated, the city may order mains where it likes up to 40,000 feet per annum. The company has averaged 68,986 feet per annum for the past 15 years, laying 52,201 feet in 1905.

G.

As the plant is privately owned, the rates paid for water and fire protection are not affected by gains or losses in the operation of the water plant.

New Haven. (H 158.) The writer was unable after much inquiry among local insurance agents to learn of any extra premiums paid in 1905 on account of water works deficiencies in New Haven.

Exhibit 12 (below) is a copy of a letter from Mr. Horace H. Soule, Jr., chairman of New Haven committee of New England insurance exchange, which indicates that in 1906 there was a conflagration advance of 20 cents in the New Haven key-rate, of which advance 15 cents were for water works deficiencies. This advance is said to have been based on reports published by the National board of fire underwriters; but the underwriters' report, attached hereto as Exhibit 13 (reproduced in part below) makes no recommendation for any such sweeping changes as are referred to in Mr. Soule's letter. It would seem that, as has already been observed in other cities, the advance in rates is based less on the actual merits of the case than on the desire to quickly recoup the losses at San Francisco and Baltimore.

EXHIBIT 12

Mr. Soule's letter, dated July 30, 1906, and addressed to C. C. Chalker, secretary, New Haven, Connecticut.

Dear Sir:

Referring to the recent conflagration advance of 20 cents which was made by the New England Insurance exchange in the city of New Haven, I beg to advise you that this advance is based on defects developed by reports published by the National board of fire underwriters, and it was the understanding that the whole or a part of this advance might be removed should the municipal authorities comply with the recommendations for improvements hereafter mentioned.

The charges applying to New Haven have been apportioned as follows, and none of the charges will be removed until all the recommendations in that particular group have been complied with.

As regards the municipal electrical inspection department. Inspector Sweetland of the exchange will be ready to advise the municipal authorities as to the requirements of such an electrical inspection department as would be considered necessary to remove this charge.

(a) Establish a municipal electrical inspection department by the passage of an ordinance and the appointment of an electrical inspector satisfactory to the New England Insurance exchange.

For the above, 5 cents.

(b) Urgent efforts should be made to replace all of the cement lined and covered iron pipes of the water distribution system by standard cast iron mains and lateral pipes.

For the above, 5 cents.

(c) Ample water supply be provided which will furnish pressure of not less than 60 pounds at any point in the city.

For the above, 10 cents.

Will you kindly furnish this information to the members of your board in the hope that influence may be brought to bear on the New Haven authorities to remedy these defects and thus remove the recent advance made by the exchange.

Very truly yours,
(Signed) Horace H. Soule, Jr.,
Chairman.

EXHIBIT 13.

REPORT OF NATIONAL BOARD OF FIRE UNDERWRITERS ON NEW HAVEN.

Dated September 27, 1904. (5 pp.)

The more important sections of this bearing on the water supply are as follows:

After describing the sources and pumping arrangements under the heading "Mains and Distribution," we have the following:

Trunk or delivery mains, 27 inch diameter, reduced to 24 inch from Lake Dawson.

Sixteen inch reduced to 12 inch from Lake Wintergreen. High pressure.

Twenty-four inch, reduced to 16 inch from Maltby lakes.

Twenty-four inch from Lake Saltonstall.

One 30 and one 20 inch from Lake Whitney to reservoir, then one 16 inch and 24 inch mains, reduced to one 20 inch main along Whitney avenue.

Records could not be obtained from the water works company relating to the lengths and material of the distribution system, but an estimate indicates 186 miles of delivery and distribution mains. Of this amount, there are 5 miles of cement lined and covered wrought iron mains and lateral pipes. Doubtless nearly all the cement pipe is in a very defective condition, and should be replaced by standard cast iron mains of not less than 8 inches in diameter. All 4 inch mains have been practically abandoned, and replaced by 6 and 8 inch diameter pipes. The business and manufacturing sections are gridironed by mains of 8, 10, 12 and 16 inch diameter. The supply of water has thus far proved ample for steam fire engine purposes."

The location and size of hydrants are described, and the hydrants are declared to be "well cared for to prevent obstruction and freezing." * * *

WATER SUPPLY.

(P. 8.) Available records could not be obtained at the water works office of the amount and description of the water mains and lateral pipe system, but mention was made that there was about 5 miles of cement lined and covered mains that have been in use since the early construction of the water works and piping system, which no doubt have become rotted, unreliable and useless, and liable to collapse at the most important time. During my visit I witnessed the removal of a section of 16 inch diameter cement lined main at Grand avenue and East street which burst during the early hours of September 22, and repairs had not been finished at 5 o'clock P. M. the same day. This 16 inch main is one of the principal reinforcing pipes for supplying this section of the city. The pressure of water could not be increased for fear of bursting such defective water mains and lateral pipes.

ELECTROLYSIS.

Superintendent David Daggett of the water department stated that electrolysis was damaging the water mains along the lines of the electric street car system, but careful inspection tests are being made by officials of the water supply company, and defects are remedied soon after discovered, both by the officials of the water and electric railroad companies.

The recommendations of this report, so far as they relate to water supply are:

(1) Urgent effort should be made to replace all of the cement lined and covered iron pipes of the water distribution system by standard cast iron mains and lateral pipes.

(2) A thorough examination should be made to determine as to the defective condition of water mains and lateral pipes caused by the action of electrolysis, and apply the proper remedies to lessen electric action by bonding the rails and suitable return wiring.

COST OF A COMPARABLE UNIT OF SERVICE.

(H 155-166.) The letters A to G have the same significance as under Chicago in same questions.

A.

The water rates are given on pages 4-7, Exhibit 7 (not reproduced here). The city pays no hydrant rentals to the company. The company will set hydrants as requested by the city, the city paying the cost of hydrant and the setting.

B.

So far as the writer has been able to ascertain there were no extra insurance premiums paid on account of the water works deficiencies in 1905. The writer has no means of determining the amount of loss, not covered by insurance, sustained by citizens of New Haven as the result of lack of water works fire protection. Fire steamers are a part of the regular fire department equipment and are usually used at fires, as the hydrant pressures in many parts of the city are not sufficient to give effective streams for buildings much over two stories in height.

C.

The amount paid in addition to water rates by the citizens of New Haven for drinking water in 1905 is estimated by the writer to have been about $25,000. This estimate does not include any artificially medicated waters, nor Apollinaris nor other natural bottled waters sold for medicinal purposes.

D.

The writer of this report is unable to make any estimate of the value of damages caused by sickness or death as the result of any inferiority in quality of the city supply.

E.

The supply to the city as a whole was at no time interrupted in 1905. A few people had at times insufficient pressure. The writer has no means of estimating the value of the damages sustained by reason of this deprivation of supply.

F.

There is no way of determining the value of damages suffered by the citizens as a result of their inability to secure extensions when and where needed. Where such extensions offered what might be considered a good return on the investment they appear to have been promptly made.

G.

As the plant is privately owned, the rates paid for water are not affected by gains or losses in the operation of the plant.

H 159. The extent to which the hotels and clubs and perhaps the merchants in some typical block in the heart of the city use other than city water for drinking purposes.

Chicago. Practically all the hotels, restaurants and clubs of the better class buy other than city water for drinking purposes, as do almost all of the principal business offices.

Cleveland. Inquiries made at three of the principal hotels, two of the principal clubs, and two of the principal restaurants, brought out the fact that at none of these establishments was the untreated city water used for drinking purposes. Many of the business offices and all the better class of private residences use spring water, or water purified by distillation or by other pro-cases, and supplied by one or the other of the various companies engaged in the business of selling drinking water in Cleveland.

Syracuse. The city water is almost universally used for drinking purposes. There is practically no sale of bottled waters except of Apollinaris or artificially carbonated waters, or such waters as may be retailed for medicinal purposes.

Indianapolis. See statement by the company in Exhibit 2, which follows Inquiry II 166.

New Haven. A number of the principal hotels, restaurants and clubs use other than city water for drinking purposes. The use of bottled or filtered waters was also observed in a few offices.

II 160. The total amount spent in extensions for the last few years, and to what extent they have been paid for by bonds, and to what extent out of earnings.

Chicago. Answered under II 94.

Cleveland. The expenditures for construction of all sorts in 1903, 1904 and 1905 were as follows:

Year.	*Total Construction of All Sorts, Including Main Extensions*	*Paid From Earnings.*	*Paid From Bond Money.*	*Balance on Hand at End of Year*	
				Earnings.	*Bonds.*
1903	$844,921 31	$576,921 31	$268,000 00	$222,245 98	......
1904	588,825 74	193,825 74	395,000 00	430,281 47	......
1905.	618,184 61[1]	397,093 85	221,090 76	301,924 47	$84,909 24

Syracuse. (II 160.) The last bond issue of $100,000, made in 1901, was used up during 1903. Extensions in 1904 and 1905 are said to have been made out of earnings, but no separation of the amounts paid for extensions appears in the annual reports of the bureau of water for those years.

Indianapolis. See Exhibit 2.

New Haven. Reconstruction (*of mains only*), meaning the replacing of old cement-lined and wrought iron pipes with cast iron mains. This includes, where a large main replaces a smaller one, the whole cost of the large main. The amounts given below are charged to maintenance account:

1901.	1902.	1903.	1904.	1905.
$27,966.10	$9,082.06	$18,082.43	$12,457.17	$19,779.91

Extensions (*of mains only*) including, where a large main replaces a smaller one, only the difference between the costs of the two. The amounts given below are charged to construction account:

1901	1902.	1903.	1904.	1905
$21,305.11	$10,518.67	$11,645.49	$14,184.12	$36,080.15

---

[1] Includes the assuming of Glenville and South Brooklyn bonds which had been issued by said villages for pipe extensions.

[2] Includes the amount paid to villages of Glenville and South Brooklyn for pipe acquired by annexation.

H 161. Rates charged and, if practicable, the revenue derived from the water used in:

Chicago. (a) Public schools. Free.

(b) Private and parochial schools. Free unless conducted for profit.

(c) Hospitals. Free unless conducted for profit.

(d) Orphan and other charitable institutions. Free.

(e) Public buildings, police stations, engine houses, etc. Free.

(f) Fountains. Public fountains free.

(g) Cemetery. Cemeteries paid by meter.

(h) Parks aside from fountains. Parks aside from fountains, free, but some supply their own water.

(i) Flushing sewers. Free.

(j) Cleaning streets by flushing or otherwise. Street sprinklers are paid for. Have no flushing machines.

(k) All other public uses. Free.

(Note.) In this connection it may be stated that about 3,835,000 gallons per day are furnished without charge for condensing water at one of the two municipal electric lighting stations in Chicago. This amount is about 13 per cent. of the total pumping capacity of the Harrison street station, which furnishes the water.

Cleveland. (a) Public schools. Free. 165,613,750 gallons.

(b) Private and parochial schools. Part free and part paid for at 5 1/3 cents per thousand gallons. $74.12. 16,526,250 gallons.

(c) Hospitals. Free, 104,565,000 gallons.

(d) Orphan and other charitable institutions. Part free and part paid for at 5 1/3 cents per thousand gallons. $109.60. 75,752,000 gallons.

(e) Public buildings, police stations, fire engine houses, water department offices, etc. Free, 161,532,500 gallons.

(f and h) Parks, including fountains. Free, 125,220,000 gallons.

(g) Cemeteries. Free, 26,175,000 gallons.

(i) Flushing sewers. Free, 87,000,000 gallons.

(j) Cleaning streets. Free, 90,000,000 gallons.

(k) All other public uses. All free.
Fires, 27,000,000 gallons.
Sewer and paving construction, 40,000,000 gallons.
Water troughs, 6,000,000 gallons.
Water department pumping station, 14,000,000 gallons.
Testing meters, 18,000,000 gallons.
Total, $183.72. Total gallons, 957,384,500.

Of the above quantity of water, 603,754,500 gallons were supplied by meter, the unmetered balance of 236,650,000 gallons being estimated. Of the metered water 3,444,750 gallons were paid for at 5 1/3 cents per thousand gallons, producing a revenue of $183.72. All the rest of the water amounting to 836,959,750 gallons was supplied free.

Syracuse. (a) Public schools. Free, no revenue.

(b) Private and parochial schools. 7½ cents per hundred cubic feet. Revenue, including that from Syracuse university, $700.55.

(c) Hospitals. 90 per cent. discount from regular meter rate. Net revenue, $250.73.

(d) Orphan and other charitable institutions. 90 per cent. discount from regular meter rates. Net revenue, $129.70.

(e) Public buildings, including police stations, engine houses, etc. Free. No revenue.

(f) Fountains. Public, free. No revenue.

(g) Cemeteries. Regular meter rates. Revenue, $49.28.

(h) Parks aside from fountains. Free. No revenue.

(i) Flushing sewers. Public, free. No revenue.

(j) Cleaning streets by flushing machines or otherwise. Free. No revenue.

(k) All other municipal and public uses. Municipal, free. No revenue. State, county and government uses paid for at regular meter rates. Revenue, $1,877.20. Total revenue from above uses in 1905, $3,032.38.

Indianapolis. See Exhibit 2.

New Haven. (a) Public schools. Free.

(b) Private and parochial schools. Regular rates.

(c) Hospitals. Charity rates, one-half of lowest meter rates.

(d) Orphan and other charitable institutions. Charity rates as above.

(e) Public buildings, including police stations, engines houses, etc. Free.

(f) Fountains. Public, free.

(g) Cemeteries. Regular rates.

(h) Parks aside from fountains. Free.

(i) Flushing sewers. Free.

(j) Cleaning streets by flushing machines or otherwise. Free.

(k) All other public uses. Free.

Total amount furnished free, as above, estimated to have been 868,000,000 gallons in 1905.

II 162. Any facts about the breaking of mains during 1905. How many breaks were there? Do they especially occur when the high pressure is put on at fires, and have these breaks at fires been observed as a handicap upon the fire department?

Chicago. (See also Exhibit 6, H 94.) One very serious break in 1905 and many joint leaks. Pressure is not increased for fires, and is never high enough to burst mains.

Cleveland. Attached hereto, Exhibit 15, is a tabulated summary of work done by the repair department in 1905, showing 59 breaks in mains, and 277 joint leaks. As the pressure on the mains is not increased during fires in Cleveland, fire steamers being used to give fire pressure, these breaks were not the result of high pressure, and there was no reason why they should occur oftener during fires than at other times.

(EXHIBIT 15.) Summary of work done by repair department during 1905. Data furnished by Mr. C. F. Schulz, First Assistant Engineer, Division of Water:

	Labor.	*Material.*	*Total.*
Pipe construction...........	$765.78	$2,244.82	$3,010.60
Hydrant construction........	121.85	318.11	439.96
Sprinkler construction.......	928.02	662.86	1,590.88
Miscellaneous construction....	13.60	13.43	27.03
Service connection construction	2,872.31	3,893.04	6,765.35
Totals............	$4,701.56	$7,132.26	$11,833.82
General repairs.............	$6,632.78	$965.32	$7,598.10
Pipe repairs................	4,128.23	1,147.34	5,275.57
Hydrant repairs............	3,334.21	1,337.41	4,671.62
Valve repairs...............	746.07	222.94	969.01
Sprinkler repairs...........	262.59	129.33	391.92
Service connection repairs....	10,022.70	3,437.10	13,459.80
Total.............	$25,126.58	$7,239.44	$32,366.02

The following leaks in the pipe system were repaired during the year 1905:

BREAKS.

1 48-inch at west shaft of Clark avenue tunnel, caused by settlement of the ground.

1 36-inch on Hough avenue between Ansel and Amesbury; pipe was split; cause not known.

1 30-inch on Spruce street at Mulberry; piece broken out of pipe; cause not known.

1 30-inch on Willson avenue south of Sweeney street; pipe cracked; cause not known.

1 16-inch on Harvard street east of Broadway; broken during grade separation work.

2 12-inch caused by grade separation work.

3 8-inch caused by grade separation work.

2 8-inch caused by settling of sewer trench.

16 6-inch caused by settling of sewer trench.
2 6-inch caused by grade separation work.
3 6-inch caused by cinders in contact with pipe.
6 4-inch caused by settling of sewer trench.
2 4-inch on hydrant branches; caused by frost heaving hydrants.
1 4-inch on Spruce street; caused by break in 30-inch main.
1 4-inch on hydrant branch; caused by electrolysis.
5 4-inch from miscellaneous or unknown causes.
1 3-inch on wrought iron pipe; caused by contraction.
Total number of breaks, 59.

Leaks in joints were as follows:

	Inch.
15	48
10	42
41	36
43	30
6	24
3	20
11	16
9	12
22	10
22	8
57	6
29	4
1	3

Total, 277 leaks in joints.

Of this number:

16 are directly traceable to settling of sewer trench;
5 are chargeable to contraction of pipe in cold weather;
18 (on 30-inch) are due to settling of pipe by reason of contractor excavating along side and under pipe;
5 on hydrant branches, caused by frost heaving hydrants;
233 from miscellaneous or unknown causes.

Summary of repairs of all kinds.

336	repairs to pipe system, consisting of 59 breaks and 277 joints recaulked; cost	$5,273.57
112	valves repaired; cost	669.01
779	hydrant repairs; cost	4,671.88
58	sprinkler repairs; cost	281.06
1,250	general repairs, consisting of leaks reported and investigated, changing valve boxes to grade prior to paving of streets, watching pipe on streets where sewers were being built, cleaning out valve boxes, repairing sewer pipes, catch basins, etc., at pumping stations, operating valves, examining connections, tes-	

ing inventory, cleaning and painting special castings, etc., 1,286 jobs; cost...........	$7,598.10
912 service connections repaired and 3,436 stopcock-boxes put to grade of new ones put in place of old; at a total cost of................	12,947.27
6,919 jobs; total cost..............................	$31,853.49

The total amount of pipe in use in 1905 was 649.957 miles; and the total number of leaks of all kinds in the pipe system in 1905 was 336, equal to 1 leak of all kinds per year per 1.93 miles of pipe.

Fifty-nine of these leaks were breaks, or equal to 1 break in pipe per year per 11.01 miles of pipe.

Deducting 44 extraordinary breaks caused by the sewer work and grade crossing separation work, leaves 15 breaks in the pipe system or equal to 1 break per year for each 43.33 miles of pipe.

Syracuse. Report of bureau of water for 1905, page 16, shows the following repairs to mains:

Mains; Repairs:	
Defective pipes........................	13
Defective joints........................	36
Defective specials......................	5
Total	54

There were no breaks which seriously affected pressure over any very large area. A few short circuits of mains had to be shut off for a period of some hours during repairs. As the pressure on mains is not increased during fires, such breaks as occurred were not due to extra fire pressure, and therefore would not necessarily cause any handicap to fire department, unless they should happen to occur just at the time of a fire and in its immediate neighborhood.

Indianapolis. See Exhibit 2, also answer to H 93 and H 158E. Four breaks occurred under fire pressure.

New Haven. There were no breaks in mains during 1905. There were some joint leaks. No extra pressure is put on for fires, and there have been no breaks during fires.

H 163. Number of hydrants of each size in connection with the city main, and the number of each size put in in the past year.

Chicago. 4,242 single 2½-inch, 13,528 double 2½-inch. 40 double 3½-inch, 560 double 4-inch, 2,130 double 2½-inch with one 4-inch. Total for 1905 is 445, all double 2½-inch, or larger

Cleveland. Total number of hydrants in use at end of 1905 was 7,642, of which 21 were 3-inch, 7,014 were 4-inch, and 607 were 6-inch. During 1905 there were put in 77 6-inch and 256 4-inch hydrants, while one 6-inch, 24 4-inch and 2 3-inch hydrants were removed. By the annexation of Glenville, South Brooklyn and Newburg Heights fourteen 6-inch and 257 4-inch hydrants were acquired.

Spokane. Total on December 31, 1905:

One-nozzle hydrants	159
Two-nozzle hydrants	2,459
Three-nozzle hydrants	191
Total	2,809

During 1905 two one-nozzle hydrants were removed and 42 two-nozzle hydrants were set, making a net increase of 40 hydrants. There is given on page 13 of sixth annual report of the superintendent of bureau of water for year ending December 31, 1905, the following summary of hydrants in use on December 31, 1905:

Kind.	*Number with 1 nozzle.*	*Number with 2 nozzles.*	*Number with 3 nozzles.*	*Total Number.*
Eddy	6	2,126	163	2,295
Mathews	136	311	8	455
Galvin	17	8	7	32
Ludlow	...	7	7	14
Chapman	...	6	5	11
O'Brien	...	1	...	1
Niagara	...	...	1	1
Totals	159	2,459	191	2,809

Indianapolis. See Exhibit 2.

New Haven. There are 992 hydrants, all of which have 6-inch connections with mains, except about a dozen old hydrants, which have 4-inch connections to mains.

II 134. The maximum hourly pumpage during the past two or three years. This is important in a city which has no reservoirs or any high elevation.

Chicago. Estimated at about 18,000,000 gallons, assuming 95 per cent. of all the pumps working at their utmost capacity.

Cleveland. About 3,750,000 gallons per hour.

Spokane. There was no pumpage, as supply is wholly by gravity. The maximum daily consumption in 1905 was estimated at 15,350,000 gallons on February 7, 1905. It is estimated that the maximum hourly consumption on that day was about 675,000 gallons. No large fires occurred at this particular time, otherwise this estimate would have to be considerably increased.

Indianapolis. See Exhibit 2. Estimated possible maximum, allowing for twenty-five streams in addition to maximum hourly consumption for other uses, 1,500,000 gallons.

New Haven. About 1,200,000 gallons per hour, estimated.

H 165. The duty of each of the pumps, or the station as a whole. Any tests that may have been made of the boiler equipment. Any statistics of coal consumption.

Chicago. See answers to H 16 and H 85. Answer shown in plate 15, not reproduced here.

Cleveland. Exhibit 3, forty-seven printed pages (not reproduced), gives the results of engine and boiler tests made in February, 1904. Exhibit 20 attached hereto gives a summary of pumping statistics for 1905 in the form recommended by the New England Water Works association. The data given in the summary as originally furnished to the writer by Mr. C. F. Schulz, first assistant engineer of the water works division, made no allowance for slip of pumps. The writer has introduced figures computed from those of Mr. Schulz, but allowing for the estimated slip of each pump.

EXHIBIT 20. Summary of statistics (for the year ending December 31, 1905) in the form recommended by the New England Water Works association.

CLEVELAND WATER WORKS, CLEVELAND, CUYAHOGA COUNTY, GENERAL STATISTICS:

Population according to census of 1900, 381,867.

Estimated in 1905 for Cleveland and suburbs using city water, 462,000.

Date of construction, 1856.

By whom owned, the city.

Source of supply, Lake Erie.

Mode of supply, pumping.

PUMPING STATISTICS:

(1) Builders of pumping machinery—Worthington, Knowles, Allis, Kilby, Holly.

(2) Description of fuel used.
  (a) Kind—bituminous.
  (b) Brand of coal—Pittsburg slack.
  (c) Average price of coal per gross ton delivered at Kirtland, $1.70 per net ton delivered at Kirtland, $1.518.
  (d) Percentage of ash—
  (e) Wood, price per cord—0.

(3) Coal consumed for the year.

(a) At Kirtland station	46,339,400 lbs.
(b) At Division station	6,235,300 lbs.
(c) At Fairmount station	1,967,400 lbs.
(d) At all stations	54,542,100 lbs.

(4) Pounds of wood consumed—none.
  (a) Amount of other fuel consumed—none.

(5) Total amount of coal consumed for the year—same as in No. 3 (54,242,100).

(6) Total pumpage for the year—

	Not allowing for slip (gallons).	*Allowing for slip (gallons).*
(a) At Kirtland station	22,053,421,992	21,043,157,183
(b) At Division station re-pumping from low pressure system into high pressure system	2,090,396,208	2,006,598,183
(c) At Fairmount station, re-pumping from Fairmount reservoir into high service system	367,489,771	317,236,308
(d) Total pumped at all stations including repumpage	24,511,317,971	23,359,931,935

(7) Average static head against which pumps work.

(a) Low service—171.81 feet.

(b) First high service—323.7 minus 171.8 equals 151.9.

(8) Average dynamic head against which pumps work.

(a) Low service at Kirtland station—198.582 feet.

(b) At Division station repumping into high service—197.795 feet.

(c) At Fairmount station repumping into high pressure—159.347 feet.

(d) Average of all water, including amount repumped—197.654 feet.

(9) Number of gallons pumped per pound of equivalent coal:

	Not allowing for slip (gallons).	*Allowing for slip (gallons).*
(a) Low service at Kirtland station	478.9	454
(b) At Division station, re-pumping into high service	395.2	371.8
(c) At Fairmount station, re-pumping into high service	186.8	159.9
(d) Total gallons pumped per pound of coal, including amount repumped into high service	459.4	438.3

(10) Duty per hundred pounds of coal:

	Not allowing for slip (foot lbs.).	*Allowing for slip (foot lbs.).*
(a) At Kirtland station.......	78,700,431	75,080,211
(b) At Division station.......	55,298,473	53,086,534
(c) At Fairmount station.....	24,836,982	21,111,435
(d) Average of all stations....	74,081,120	70,643,756

Cost of pumping, figured on pumping stations expenses, viz.:

(a) At Kirtland station..................	$84,639.64
(b) At Division station..................	15,411.99
(c) At Fairmount station...............	3,486.32
(d) Total of all stations...........	$103,537.95

(11) Per million gallons pumped.

	Not allowing for slip.	*Allowing for slip.*
(a) At Kirtland station.......	$3.838	$4.023
(b) At Division station.......	7.373	7.680
(c) At Fairmount station.....	9.482	11.155
(d) Average of all stations....	4.224	4.432

(12) Per million gallons raised one foot (dynamic).

	Not allowing for slip.	*Allowing for slip.*
(a) At Kirtland station.......	$0.01936	$0.02028
(b) At Division station.......	0.03728	0.03883
(c) At Fairmount station.....	0.05950	0.07000
(d) Average of all stations....	0.02137	0.02241

(Note.) Figures under the caption "allowing for slip" in items 6, 9, 10, 11, and 12 were inserted by D. H. Maury, and are based on the slip estimated for each pump. All other figures were furnished by C. F. Schulz, first assistant engineer of water works division.

Syracuse. There is no pumping station, no pumps, and no boilers.

Indianapolis. See Exhibit 2. 30,300 tons of coal consumed for all purposes at all stations. No station duty tests of engines available, as the same boilers furnish steam to air compressors as well as to all pumps. The Snow pumping engine at time of its first trial held the record for high duty under test conditions.

New Haven. The six million gallon compound, condensing, low duty Worthington pumping engine at Saltonstall pumping station, tested on January 1, 1885, gave 61,181,407 foot pounds per hundred pounds of coal. The 10,000,000 gallon compound, condensing, high duty Worthington pumping engine at Whitneyville pumping station, tested by Mr. W. L. Mather in April, 1896, gave 116,453,000 foot pounds per thousand pounds dry steam; 91,413,455 foot pounds per hundred pounds coal, and 94,775,900 foot pounds per hundred pounds combustible. The 10,000,000 gallon compound condensing high duty D'Auria pumping engine at Saltonstall pumping station, tested in 1905 by Professor C. H. Richards of Yale University and Professor Wm. H. Kenerson of Brown University, gave 114,000,000 foot pounds per thousand pounds steam while pumping at the rate of 7,480,000 gallons per twenty-four hours, and 114,500,000 foot pounds per thousand pounds steam while pumping at the rate of 9,050,000 gallons per twenty-four hours.

From data as to coal consumed, water pumped and dynamic head, furnished by the officers of the company, the writer has figured the working duties of the steam pumps for 1905, after allowing for slip, as follows:

Ten million gallon high-duty Worthington at Whitneyville, 71,500,000 foot pounds per hundred pounds of coal. The 6,000,000 gallon low-duty Worthington at Saltonstall, 51,570,000 foot pounds per hundred pounds of coal. The 10,000,000 gallon high-duty D'Auria at Saltonstall, 70,840,000 foot pounds per hundred pounds coal.

The data furnished were not very complete as to specific details, but if they were correct, and the writer has no reason to think they are not, the station duties given above are remarkably high, when the types and ages of the pumps are considered.

H 166. Extent to which business and domestic consumption is not at all dependent upon the water company, and the extent to which consumers have both sources of supply, so far as records obtainable will indicate.

Chicago. Very large amounts of drinking water purchased from other sources. Some industries located near the river pump river water for certain uses, but the river water is so foul that it cannot be used for all industrial purposes. Domestic consumption is practically dependent upon city supply, and on drinking water purchased at retail prices. See also answer to H 158.

Cleveland. There are practically no private wells in use in the city, as the board of health usually condemns them as fast as its attention is called to them. There are very few cisterns in use for drinking water. For domestic consumption almost everyone in the territory supplied by the water mains is entirely dependent upon the city supply, supplemented by such water as may be purchased for drinking purposes from one or the other of the local companies engaged in purveying drinking waters. As a rule, all business and industrial establishments have connections with the city mains, but a number of the latter class, such as the American Steel & Wire company, with its many branch works, the Cleveland Provision company, the Cleveland Electric Illuminating company, and others, have their own private pumping plants, and draw the major portion of their water supply from lake, river or wells.

Syracuse. There are very few private wells or cisterns in use. A number of industries along the Erie canal and some along Onondaga Lake have their own pumping plants, drawing water from these sources for industrial uses only. The city water is used almost universally for drinking purposes.

Indianapolis. See Exhibit 2. Underlying the larger part of the city, and especially those portions adjacent to White river and Fall creek, there are two strata of water bearing gravel, separated by a stratum of blue clay of varying thickness. Much water can be obtained from the upper stratum by wells only 20 or 30 feet deep, while the second gravel stratum can be reached by wells of from 90 to 100 feet in depth. Below this gravel there is a fissured Corniferous limestone from which wells from 275 to 400 feet can be made to yield large amounts of water. The ease with which water can be obtained from these sources, and more especially from the upper gravel, has had a very important bearing on the entire water works situation in Indianapolis, as more fully explained elsewhere, especially H 158 and in general historical sketch.

New Haven. The Candee Rubber company, and Messrs, Sargent & Company, and W. & E. T. Fitch have wells in addition to their city supply to save money in water rates. There are only a few places in New Haven where wells will yield any considerable quantity of water. The business and domestic consumption is, as a rule, dependent upon the supply furnished by the water company, supplemented to some extent for drinking purposes by bottled or filtered waters. The Winchester Repeating Arms company is said to have drilled a well about 8,000 feet deep some ten years ago in search of water, but without success.

Indianapolis. EXHIBIT 2.

Information furnished by the president of the water company as an answer to Inquiries H 158 to H 166, inclusive.

Contents of Paper.

Some history of the water company.

Information as to contract and business of the company.

Extract from meeting of the city officials, the Commercial club, and water company in relation to rates for insurance.

Answers to questions propounded by member of the Commission.

Letter from the United States Cast Iron Pipe and Foundry company.

Statement from Mr. Hill, City Expert.

Indianapolis, Indiana.

This city is built upon the east and west bank of the west fork of White river.

Public Water Supply.

The public water supply of the city is furnished by the Indianapolis Water company, a private corporation, and a successor to the Indianapolis Water Works company.

Indianapolis Water Works Company.

Indianapolis Water Works company was organized October 7, 1869, and continued in business until April 21, 1881, when it was sold out by the sheriff. The failure was due to the continued use of wells by the people after the company went into business.

Sources of Supply.

Underlying the city is water-bearing gravel, which afforded an abundant supply of water. This water was obtainable at a depth of 18 to 25 feet. In addition to this is another supply, obtainable at about 90 to 100 feet below the surface, which is separated from the first vein by a layer of blue clay, varying in thickness. There is also another supply found in the limestone at a depth of 275 to 400 feet. These various veins are used for domestic supply, as well as for factories and railroads.

The report of the expert committee appointed by the city and the water company, made October 26, 1904, confirms the reasons stated above for the failure of the water works company, by which a loss of more than $1,000,000 was sustained by that company. Page 31 of that report estimates that there are 75,000 private wells used more or less regularly for drinking purposes, showing that a majority of people get their drinking water from these sources. Page 29 furnishes further information, showing that after an existence of thirty-eight years the people have not abandoned their wells.

A recapitulation of certain wards, as taken from the report, shows the following:

Ward.	*Population.*	*No. using city water for drinking and general purposes.*	*No. of water closets.*	*No. using water for baths.*
1	14,842	474	171	155
4	11,611	502	414	581
5	14,213	271	244	123
9	13,845	820	234	220
11	6,908	310	131	60
12	8,017	59	24	13
14	9,344	457	70	61
15	11,106	573	111	103
	87,906	3,426	1,399	1,128

These figures show that in a population of 87,906 there are only 3,426 taps patronizing the public water supply, 1,399 water closets and 1,128 baths. This report furnishes conclusive evidence that many of the citizens still cling to their wells without regard to sanitary conditions or convenience. Water so easily obtained as it is from the various veins, makes severe competition for a water works, whether it be owned by the city or a private corporation.

Indianapolis Water Company.

The Indianapolis Water company has a capital stock of $500,000, and a bonded indebtedness of $3,200,000. In addition to this indebtedness are the current bills and contract obligations incurred on account of construction work, so that in the near future the bonded indebtedness will be increased considerably.

The city has an option to buy the company on giving six months' notice. The language of the city ordinance (Sec. 7) is as follows: "That at any time on giving six months' notice, the city shall have the right to purchase from the company all the buildings, machinery and pipes of said water works, with all its corporate rights and privileges (but not including any franchise herein granted or that may hereafter be granted to the company, but not including any estimated value of this charter), at such price as may be agreed upon by the common council and the board of directors of the company."

The contract between the city and the water company provides for the payment of $45 per hydrant per annum, also that the city can require the company to lay 40,000 feet of mains each year, taking one hydrant every 500 feet. The term mentioned in the present contract expires January 1, 1908, but there is a clause which continues the contract until the city and the company can agree upon a new one. In addition to furnishing water for the hydrants, the company is required to furnish water for drinking fountains which run a continuous stream. The price of the drinking fountains is $45 each per year. In addition to this, the water company furnishes to the city *free* of charge water from its mains as hereinafter stated, namely:

"Water for a fountain in each of the following parks: Military park, University park, Garfield park, St. Clair park, Highland and Fletcher parks, Brookside park and Riverside park, and one in each ward park when erected during this contract. Also water for each engine house, each reel house, each station house, city dispensary, thirty thousand (30,000) gallons of water at each per month, if so much shall be required. Also water for police headquarters, four hundred thousand (400,000) gallons per month, if so much shall be required. Also water necessary for the purpose of flushing and cleaning public sewers and improved streets and the filling of public cisterns within the reach of the line of water pipe. Also water for public latrines when constructed under streets. Also water for Tomlinson hall and market houses, five hundred thousand (500,000) gallons per month in the aggregate at said hall and market houses, if so much shall be required. Also water for the city hospital, six hundred thousand (600,000) gallons per month, if so much shall be required. Also water for public baths when established, one hundred thousand (100,000) gallons per day, if so much shall be required. Also water for sprinkling lawns and roadways in all public parks, five million (5,000,000) gallons per month in the aggregate, if so much shall be required. Water from the canal to supply a four (4) main pipe for the lily pond in Riverside park, the pipe for such 4 inch line to be furnished, laid and maintained by the city, and the water drawn therethrough for said pond not to be computed as a part of the said five million (5,000,000) gallons above mentioned. The members of the fire department may, without cost to the city, use water from the fire hydrants or plugs to sprinkle the streets immediately adjacent to the several engine houses and hose reel houses, provided ordinary sprinkling nozzles are used for that purpose."

The company is supplying 15,500 attachments. This includes all classes of consumers in the population of 222,000 (estimated). * * * Meter rates range from 18 cents per thousand gallons down to 1½ cents. The company is using meters only for commercial uses and large consumers. The company pays $8.20 (on the hundred) of its gross receipts for taxes. The company is compelled to repair the street, where it cuts it, at its own expense. The streets of this city are broad and the lots large. This condition is very desirable for the city, but increases the outlay of public utilities. The company has 315 miles of mains. It has three pumping stations with a capacity of 62,000,000 gallons in 24 hours. The average daily pumpage is 18,798,772 gallons. The real estate owned by the water company for its buildings, filter beds and protection of the water supply is about 225 acres. It also owns the canal 9 miles in length and a dam across White river. The water from the canal is used on the filter beds and also for power.

(Exhibit 2, Continued.)

Indianapolis, April 2, 1906.

¶ 158. The fire insurance rates and any recent changes in the same, and any report made by the underwriters within two or three years upon the fire insurance protection.

We herewith attach certain extracts from the minutes of the meeting of the commercial bodies of the city of Indianapolis and the insurance commission held November 22, 1904. We also herewith submit a statement of what the water company has accomplished since that time. We have removed 4,700 feet of 6 inch (mains) substituting 20, 30 and 36 inch (mains). We have laid a 36 inch main from the Riverside station to the intersection of Capitol avenue and Ohio street, which is more than is required by the commission. A 36 inch main is equal to 2.25 times a 24 inch main in delivery. For the betterment of the fire protection at the stock yards the board of public works ordered a 10 inch main laid whenever the Stock Yards company would connect its system to it. So far that company has not gotten ready to make the connection. The fifth requirement of the commission has been complied with, also the sixth, and the seventh is being complied with. Notwithstanding we have complied with 92 per cent of the requirements, the rates have not been decreased. In our opinion the reason for not decreasing the rates is found in Mr. McGregor's remarks before the meeting. We think it not worth while to go any farther because there is a definite reason furnished.

H 159. The extent to which the hotels and clubs and perhaps the merchants in some typical block in the city use other than city water for drinking purposes. I found, for example, after our talk about conditions in Chicago, that the Grand hotel uses well water and (that) probably other places refrain from using the city water.

All hotels patronize the water company, also all the clubs and mercantile houses, and all blocks except three, Lombard, Lemcke and Law building. The owners of these buildings say they can pump water from wells for less than we can supply it for. Where water is so easily obtained and concerns have machinery and engines, they claim they can get water for practically nothing.

H 160. Mr. Boyd told me that he would be glad to give you the total amount spent in extensions for the last few years and to what extent they had been paid for by bonds and to what extent out of earnings.

We have added to our system since 1900, 280,176 feet of mains and paid for them by sales of bonds, earnings of the company and other resources.

H 161. The rates charged, and, if practicable, the revenue derived from water used in:

(a) Public schools, 6 cents per 1,000 gallons.

(b) Private and parochial schools. Flat rates.

(c) Hospitals. Private, 6 cents; public, free up to certain amount.

(d) Orphan institutions and other charities. 6 cents.

(e) Public buildings, including police stations, engine houses, etc. Free up to certain amount.

(f) Fountains. Public, in parks, free.

(g) Cemeteries. Free.

(h) Parks, aside from fountains. See extract from contract as to free uses, hereto attached.

(i) Flushing sewers. Free.

(j) Cleaning streets by flushing machines or otherwise. Free. (For details, see page 3 of city contract.)

(k) All other public uses. See contract.

Taps inserted free. Meters furnished and maintained without cost to consumer. Bills rebated for unexpired time at same rate as paid.

House of 2 rooms, $3 per annum.
House of 3 rooms, $4 per annum.
House of 4, 5, and up to 6 rooms, $5 per annum.
For each additional room, $1.
Bath—hot, cold, shower, $3 per annum.
Closet, $3 per annum.
No charge for laundry tubs.

Sprinkling lawns, street, gardens, washing porches, windows and pavement charged for according to frontage. (For details, see attached schedule.)

H 102. Any facts about the breaking of mains during 1905. How many breaks were there? Do they especially occur when the high pressure is put on at fires and have these breaks at fires been observed as a handicap upon the fire department? (Compare answer of H 93.)

On July 25, 1905, we finished the 30 and 20 inch mains. On August 6, while running on a fire, a 20 inch plug in a cross broke and the upper half went out. It is no uncommon occurrence for a plug to blow out, but to break in two is almost an unheard of accident. From the dates given you will observe that the line could not in so short a time be tested out. The work upon the 30 and 20 inch line has been and was a matter of pride with the water company. The lines were laid promptly and it was remarkable that there were no other accidents than the breaking of the 20 inch plug. Pipe tested to 300 pounds, plugs are not so tested. * * *

Language taken from the report of Mr. J. W. Hill, the expert employed by the city in 1898 to examine the water company's system and report to it as to its condition (found on page 43, first paragraph).

"The cast iron pipe, special castings, fire hydrants, stop valves, and water meters have each been obtained from the best manufacturers and, depending upon examination of portions of the pipe which was laid during the early years of the water works, are in a good state of preservation and not materially injured by time. Sections of water pipe said to have been laid 50 years ago were cut out of the lines at different places, and all of these were found to be in as good condition to resist the pressure of water as when laid, and but slightly affected by the deposit from the water upon the inner surface. In fact, for pressure and capacity to deliver water, these older lines of pipe have suffered so little as to make it quite difficult to fix a limit to the durability and usefulness of the pipe system. We have had occasions to make many examinations of cast iron water pipes which have been in service for several years, and in no instance has the condition been so satisfactory as this. So far as decay of pipe or tuberculation and deposits on the inner surface are concerned, the pipe system and its appurtenances should be in good condition a century hence."

November 22, 1905, a 30 inch main in Ohio street burst. 4,000 feet of 30 inch mains were purchased for this line and after it was received it was found to be unsatisfactory and not up to the standard required by the water company. The water company had all the pipe removed from the street and piled up so that the company shipping the pipe could take it away as it would dispose of it. This pipe was replaced with pipe manufactured especially for the water company at Louisville by the United States Cast Iron Pipe and Foundry company. It was one of these new pipes that gave away. Why it gave away is a mystery. Examination of the pipe after the break showed that there was a fine hair crack in the spigot end, but not observable. This may in some measure account for the accident. Running near and parallel with the main is the interurban track upon which heavy cars run. This may to some extent have unsettled the main. This pipe stood pressure from July 26, 1904, to November 22, 1905, one year and four months.

In this connection we attach herewith a copy of a letter written the board of public works by the United States Cast Iron Pipe and Foundry company, who had seen the criticism of the newspapers upon the mains purchased by the water company.

April 19, 1905, accident occurred at the pumping station in a flanged 30 inch pipe. This pipe had stood pressure for more than 20 years. The support under the pipe, which was laid on the bottom of the basement of the pumping station, which is sand and gravel, must have been slightly disturbed by reason of the flood, thus putting an unequal strain upon the pipe.

In putting in the 42 inch suction for the Snow and Gaskill engine, we excavated under the 36 inch pipe and near the 36 inch "Y." It was anticipated that there would be some settlement of the earth, and provision made for it, but the constant running over the pipe and the "Y" by the Bay City machine, which weighs about 40 tons with its ballast, digging the trench, which was 20 feet, and lowering the 42 inch pipe, caused too great a disturbance of the earth and the result was the breaking of the 36 inch "Y." March 20, 1905.

During 1905 the water company raised fire pressure 519 times, and the above four are the only accidents that interfered temporarily with our furnishing fire pressure. While these are a very unusual number of accidents for us, yet we think that in the light of the explanations and the fact that there was only one pipe in our system of 265 miles to give way, that it is a fine showing for our pipe system and well worth a favorable notice. * * *

H 163. The number of hydrants of each size to connection with the street main and the number of each size put in the past year.

The number of fire hydrants and kind is as follows:

1,546	Mathews double, 6 inch.
34	Mathews single, 4 inch.
81	Mathews triple, 6 inch.
89	Mathews 3-way and engine, 6 inch.
11	Mathews 4-way, 6 inch.
*318	Holly single, 4 inch.
95	Holly double, 6 inch.
1	Holly 2-way and engine, 8 inch.
*10	Gaskill single, 4 inch.
16	Michigan double, 4 inch.
2,201	fire hydrants in service March 10, 1906.

125 hydrants set during the past calendar year.

---

* Being removed, 2-way substitute.

H 164. Maximum hourly pumpage during the last two or three years. This is important in a city which has no reservoirs on any high elevation.

The domestic pressure carried is from 60 to 65 pounds, fire pressure from 100 to 120. * * * (For hourly pumpage see copy of table 8 hereto attached.)

TABLE NO. 8, showing the rate at which water was pumped at different hours, expressed in million gallons per 24 hours and based on hourly counter readings from the pumps at both stations, October 21-27, 1904 (from page 20 of the report of the Joint Commission of 1904).

Hour.	*Rate in million gal. per 24 hours.*
10-11 p. m.	12.5
11-12 "	20.5
12 p. m.-1 a. m.	19.2
1- 2 a. m.	15.5
2- 3 "	11.6
3- 4 "	12.3
4- 5 "	10.7
5- 6 "	11.8
6- 7 "	12.9
7- 8 "	17.0
8- 9 "	18.5
9-10 "	17.7
10-11 "	20.6
11 a. m.-12 m.	18.3
12 m.-1 p. m.	16.8
1- 2 p. m.	19.8
2- 3 "	17.5
3- 4 "	20.2
4- 5 "	16.2
5- 6 "	17.3
6- 7 "	15.7
7- 8 "	15.1
8- 9 "	13.3
9-10 "	12.6

H 165. The duty of each of the pumps or the stations as a whole. Any tests that may have been made of the boiler equipment. Any statistics of coal consumption.

The pumping capacity of the works is 69 million gallons. Tons of coal consumed in 1905 were 30,300.

H 166. Extent to which business and domestic consumption is not at all dependent upon the water company and the extent to which consumers have both sources of supply, so far as records obtainable will indicate.

Owing to the ground supply the users of water are independent of the water company. The water company is patronized because of the superior quality of the water furnished and because the facilities furnished by the water company can not be supplied for less money. * * *

Conference of the commercial bodies of the city of Indianapolis, held November 22, 1904. Page 18.

Mayor Holtzman: I would like to have information as to wherein the fire department is insufficient, and the water works as well, if you have the specifications there.

Mr. G. H. Lermit: Would you like me to read the charges?

Mayor: You might read them so that we will all know what they are.

Lermit: No. 1. Water supply and street mains. "Replace all 6 inch by 8 inch or larger mains in congested district." In the East where the government officials have been working, they have thought it expedient to call for very much larger mains than we are calling for, and I think perhaps we are too moderate in that respect. They will not be satisfied with less than 8 inch mains in the residential districts.

No. 2. "Replace the 12 inch main supply on Indiana from St. Clair to Washington by a 24 inch pipe, which should be a continuation of the same sized main used on the above named avenue from the pump house to St. Clair street." I have heard that you are contemplating putting down a 36 inch main. We are only asking for a 24 inch main. We are too moderate.

Mayor: Of course we expect you to give us something for that.

Lermit: Of course we will give you everything we can. We are in the humor.

(3) ."Install a duplicate 24 inch supply pipe from the main station to connect with the 24 inch on Washington street at or near the old pumping station which could come across by way of Blake street."

(4) "Replace the 6 inch and 8 inch mains on Kentucky avenue and supplying the stock yards by 12 inch mains with a larger supply main on Morris street."

(5) "Replace the 6 inch main supplying the factory district on Chestnut south of Ray street by a 12 inch main."

(6) "All cisterns used for steam engine service should be connected up with the city mains."

(7) "Replace all single-way Holly hydrants by standard 2-way hydrants." That is all we ask in reference to the water supply and street mains.

Now as to the fire department, our recommendations are:

(1) "Additional men should be had to bring those hose wagon companies having but 4 men to 6 men each, and the service truck companies having 5 men to 8 men each, and the aerial truck companies having 7 men to 10 men each, necessitating the employment of at least 40 additional men to man the present apparatus.

Mr. Edwin H. Forry: Does that apply to all the fire department stations in the city or to those in the congested district only? I believe it was held yesterday that it was for the entire city.

Lermit: That would be for the entire city, for all these companies are not within the conflagration area.

Now (2) "All electrical wires should be placed underground. The wires in this city are strung in the alleys where they interfere with the hoisting of ladders."

Now those are the only two recommendations we make in reference to the fire department. As I said before, gentlemen, if you will comply with our suggestions in reference to the water supply and street mains, the 5 per cent. charge now put on on that account will be taken off. If you will comply with our requirements in reference to the fire department, the 5 per cent. charge now put on for those deficiencies will be taken off. And the other two 5 per cents. for unprotected vertical openings and unprotected openings in side and rear walls, 5 per cent. each, apply to individual risks where these defects exist, and will be taken off as soon as the owner of the building likes to comply with those requirements, so that it is up to the city and it is up to the individual owners to have these charges removed as soon as they see fit; and not only that, when these charges are taken off, at the same time the base rate of the city will be lowered and you will get your insurance cheaper than you were previous to the time these charges were put on.

Mr. H. P. Wasson: What do you mean by cheaper than they were before the charges were put on?

Mr. Lermit: 10 to 15 per cent.

Mr. Wasson: Instead of being an advance of 20 per cent. it will be 15 per cent. less.

Page 33.

Mr. P. D. McGregor, representing the insurance companies:

"Take the city of Baltimore, a fairly level city. Baltimore had a wonderfully good fire record—I mean, good absence of fires, which is the way we express fire record—well, Baltimore, a well settled city, not much change in its business, some buildings there that have stood 50 or 100 years, practically as good as when built; but on a certain Sunday, when the conditions were not different from any other Sunday, no great high wind, the streets were clear of most vehicles that are there on week days, a fire breaks out in a wholesale dry goods store—why, nobody has yet learned. Some think it was a cigar or cigarette stump, some trivial cause. It does not matter what it was. They have got lots of water there and a fire department, and they are within easy reach of other cities and could couple onto their hydrants, but the fire spread and spread and burned something like 48 hours before it could be said to be under control, and the result was a loss variously estimated from 50 to 85 million dollars. Perhaps 60 per cent. of that was recovered from the insurance companies. That comes from you, and you, and you, and from Tom, Dick and Harry over the country, and of course that loss is as much a loss as the other. People are accustomed to say the insurance is so much, therefore the net loss is so much. Of course that is fallacious, the loss is the loss. The part of the loss that is covered by insurance is scattered and spread out among those from whom the insurance companies collect premiums, but it is loss none the less. But be that as it may, if that fire shall produce as much loss as we expect in one-third or one-half of an average year, making the loss for that year exceed the normal loss one-half, *some drastic steps must be taken to get that money back*. That is what ordinary business prudence would dictate. So the natural thing would be to do the same thing as was done after the Chicago fire, but in less degree. At that time the rates were practically doubled, there was not any discrimination between cities. The insurance companies just said, we will double your rates until we can find out where we are. We have progressed some since then. A good many of us, I among the number, thought just after the Baltimore fire that the proper thing would be to make a flat advance of 20 per cent. on all the cities of 25,000 population or over east and west, until we could find out something about what we were going to do; but those wiser and better posted than I said, No, we cannot do that, that would not be fair to our customers and would not be just. We have met with a calamity, we will have to take some of our surplus and pay for it, and we will look into the matter carefully and dispassionately and we will find out as far as we can how liable we are to have another conflagration of that kind, find out what contributed to the spread of that conflagration, and then we will take up each city in its turn as we can reach it, make our investigation, discover how nearly they are akin to the conditions in Baltimore, and we will then try to bring about the remedy. *Mind you, nothing is said about largely increasing the rate, but we will bring about revenue to the end that the fire waste must be lessened.*"

United States Cast Iron Pipe and Foundry Co.
Chicago, November 28, 1905.

The Department of Public Works,
Indianapolis, Indiana.

Gentlemen:

Water Supply.

We have our attention called to some newspaper articles relative to a recent fire that you had in the city of Indianapolis, during which a 20 inch cast iron pipe burst under pressure, and we have had our attention particularly called to an editorial in the "Indianapolis News," November 23, wherein they speak of needing a high pressure fire system and where they state that your water company "is to be credited with the laudable purpose of improving the quality of its water, but as to fire purposes, either its pipe(s) are rotten or it is impracticable to attempt to accomplish what it pretends under its contract to accomplish."

While of course it is to be regretted that under fire pressure when a fire is raging a piece of pipe should break, still such a catastrophe cannot in any sense be attributed to carelessness or neglect on the part of the water company, and perhaps for the purpose of setting the board of public works straight on this difficulty, it is no more than proper for us, who are large manufacturers of cast iron pipe, and who have, we think, sold the Indianapolis Water company the bulk of the pipe they have installed in your city for many years, to write this letter in full exoneration of any seeming neglect or carelessness on their part when purchasing pipe for their requirements.

We say unhesitatingly that in all our experience in selling cast iron pipe to various large municipalities in this country, also private water companies (and we presume we sell practically three-quarters of them, as we are the largest manufacturers of cast iron pipe in this country) there is no one who is so particular and so persistent in demanding the most rigid inspection and the best pipe that can be made as Mr. Davis, the president of your company. In fact, many times we have deemed him altogether too technical in calling our attention to or perhaps rejecting certain pieces of pipe that might be overlooked by outsiders, but which he absolutely refused to retain and called upon us to replace with other pipe.

Regarding the breaking of the 20 inch pipe in question, would say it is the effort of this company to never ship any pipe but what we consider first class in every way. Our pipe is all very thoroughly tested to 300 pounds hydrostatic pressure before shipment and scrutinized very closely by inspectors, but, at times, in spite of the most careful inspection, a piece of pipe might get installed in the line with some inherent defect that under certain conditions might result in a breakage.

Then again there are conditions existing at times when a pipe line is under pressure where a break might occur that would not be at all the fault of the pipe, but might be caused by the ground in which the pipe is laid or for other reasons outside of the pipe in question. For instance, a couple of weeks ago the city of Chicago had a very bad break in a 36 inch main that flooded the streets and the section where the break occurred and caused a large amount of damage and curtailed the supply of water. This pipe had been installed some 12 years, but when taken out showed no deterioration whatever, but the perfect metal, and no reason so far as experts could determine why it should break unless it was broken by the ground sagging or by vibration from the top of the ground. This piece of pipe was laid under 10 feet of fill and a great many trains passed over the top of it, and the ground being perhaps a little spongy, the indications are that the vibrations from the trains passing, or the ground slipping away from beneath the pipe caused it to sag and break. We have known of breaks in mains in Cincinnati and Cleveland which occurred after pipe had been installed from 15 to 25 years, and had been in use continuously and after examination of such breaks, the general consensus of opinion was that they were caused by the soil giving away where they were laid, or exterior vibration, and not through any fault or defect of the pipe. We take this occasion to say to your board that the Indianapolis Water company have laid a great deal of pipe in the last two or three years, and some large mains, and, so far as we have informathey have had as little trouble with their water works distribution system as any company or municipality that we are aware of, and this we think is on account of the carefulness with which they install their material.

Yours truly,

UNITED STATES CAST IRON PIPE AND FOUNDRY CO.

(Signed) A. J. GOODHUE,

Western Sales Manager. J.

(End of Exhibit 2, which was furnished by F. A. W. Davis, President, Indianapolis Water company.)

Chicago. The engineer's general description or supplementary report, so far as it has not been embodied in the answers to the questions in the schedule, is as follows:

General Description.

The city of Chicago lies low and almost level. The surface elevations of the main portion of the city average twenty-five feet above low mater mark of Lake Michigan, ranging from fifteen to forty feet. In Washington Heights, a residence section of about two square miles in the southwest portion of the city, the elevations range from thirty-five to ninety feet, and average about sixty feet above the low water mark of the lake. (See plate I, not reproduced here.) * * * The Chicago river, and its north and south branches, divide the city into three parts, locally known as the "North side," "South side" and "West side" respectively. The main stream originally flowed eastwardly into the lake at a point a little to the north of the center of the city shore line, but since the completion of the sanitary canal, the current in the main stream and in part of the south branch has been reversed, the water flowing from the lake into the river and the south branch, and thence southwesterly through the sanitary canal into the Illinois river. The business center of the city lies a few blocks south of the main stream, and a few blocks west of the lake. The best residence districts are near the lake, to the north and south respectively, and some distance from the business center. More important industrial and manufacturing establishments are to be found to the southwest and along both branches of the river. The population of the entire city in 1900 was by government census 1,698,575. The population on January 1, 1906, was estimated at about two million. The city limits enclose an area of 190.638 square miles, of which 3.875 square miles are within the original limits of the village of Rogers Park, annexed in 1893, and still supplied by the Rogers Park Water company. Underlying most of the city is a stratum of stiff blue clay about one hundred feet in thickness, resting on bedrock. While there is a little water in the sand pockets to be found in this clay, shallow wells sunk into it would yield only small amounts, which would naturally be much polluted, so that there are very few shallow private wells in the city. Water can be had by sinking wells 1,400 feet or more into the more pervious rocks, but the cost of this sort of well for private use is prohibitive, so that the citizens may be said to be almost entirely dependent for domestic consumption upon the city supply, supplemented to some extent by cistern water, and for drinking purposes by table waters purchased at retail prices. See II 2. * * *

HISTORICAL SKETCH.

Most of the information contained in this sketch has been condensed from the interesting papers by Mr. J. H. Spengler and Mr. Henry W. Thurston, Exhibits II and III (not reproduced here).

The first permanent settlers in Chicago dug wells near their own houses. With the growth of the population, the water from these wells became polluted and insufficient, and water was hauled from the lake in carts and peddled at from five to ten cents a barrel. In 1836 the Chicago Hydraulic company got permission from the state to pump water from the lake to supply the city and citizens, but the panic of 1837 so interfered with the affairs of the company that it was not actually ready to begin pumping till 1842, and even then could only supply a few people on the south and west sides of the city, so that the majority still used either well water or water hauled from the lake. The epidemic of cholera which, with other diseases, killed one person out of every fourteen in the city, brought home to the people the necessity for a supply of good water sufficient for the whole community. Accordingly, they asked the state legislature to give a charter to all the people of the city, acting together, permitting them to put in a complete water works plant. This charter was granted in 1851, and the Chicago City Hydraulic company was formed. The plant installed by this city company was Chicago's first public water system. The rights of the Chicago Hydraulic company were bought out by the city, and the work of the new system was begun in 1852. The pump, well, building and water tower were finished in the summer of 1853, but it was not until early in 1854 that the inlet pipe was ready. In 1854 an elevated reservoir was built at La Salle and Adams streets, where the Rookery now stands, and in 1858 a 500,000 gallon reservoir was erected on the North side and another of the same capacity at Monroe and Morgan streets on the West side. By 1861 there were two pumping engines, one erected in 1853 and the other in 1857, and about ninety-five miles of cast iron pipe. Meanwhile the sewage and offal from the growing community was already beginning to pollute the lake water as far out as the intake, and after several remedies for the evil had been considered, it was finally decided, upon the advice of Mr. E. S. Chesbrough, to tunnel under the lake to a crib, to be built two miles out from the shore. This work was executed successfully, and late in November, 1866, the last stone of the tunnel was laid, the completion of this part of the work being celebrated with much ceremony and great enthusiasm. The first city pumping station was at Chicago avenue, and in 1867 this station was rebuilt and enlarged, and the present new water tower was constructed to replace the old one. All this time the city was growing at a rate beyond all precedent, and a second lake tunnel was planned in 1870 from the two-mile crib to the Chicago avenue station, and thence under the land to a second station to be built at Twenty-second street and Ashland avenue.

Before this work could be fairly begun, the great fire started on Sunday, October 8, 1871, and on October 9 had reached the water works, driven away the engineers and disabled the engines. Repairs on these were started as soon as possible, and by October 17 one engine was again at work; by November 10 another, and by November 30 all three were running. The work on the new tunnel was completed in July, 1874, and the Twenty-second street pumping station was put in operation in 1876. As the city grew and its sewage, etc., became greater, the water supply became more and more polluted. The construction of a second water works system, consisting of the four-mile crib with tunnels connecting it with new pumping stations at Fourteenth street and Indiana avenue and at Harrison street, near Halstead, was the next important step forward, work being begun in December, 1887, and finally completed in 1892. In the meantime the town of Lake View, with its crib and tunnel and pumping station and mains, was annexed in 1889, and the tunnel was subsequently extended to a new crib two miles from shore, which was put into service in 1896. The other adjacent suburbs, Hyde Park and the town of Lake, were annexed in 1889, together with other then existing water works systems, and the city thereafter replaced their pumping stations with the large Sixty-eighth street pumping station, and extended a tunnel for its supply out to a new crib two miles from shore. The Washington Heights plant was the next to pass by annexation into the possession of the ever-growing city. This took place in 1890. The village had been pumping from a well 1,350 feet deep. In 1893 the city enlarged this well, and in 1895 extended a sixteen inch main from the Sixty-eighth street pumping station to supply the pumps at Washington Heights. Norwood Park, with its well and small pumping plant and water tower, was annexed in 1893. The village of Rogers Park became a part of the city in 1893, but its water works plant was then and still is owned and operated by the Rogers Park Water company. To the water works appliances built or acquired as just described, the city from time to time made additions or extensions, but these were never completed fast enough to keep pace with the growth of the population, and its demand for more water.

The details of the system proper as it exists to-day are described in subsequent portions of this report, and in the plates and exhibits which accompany it. All this time the pollution of the water supply by the city's own sewage continued. Even with the cribs from two to four miles from shore, floods in the river, or offshore winds would sweep the sewage out to the cribs, and bad water and the sickness and death which follow in its train were the results.

At length in 1885, the elder Carter Harrison, then mayor of Chicago, appointed a commission of eminent hydraulic and sanitary engineers to devise means to so dispose of the city's sewage that it should no longer contaminate the water supply. The head of this commission was Mr. Rudolph Hering, and his associates were Messrs. Benezette Williams, Samuel G. Artingstall and L. E. Cooley. It is believed that the final report of this commission was never printed. The preliminary report presented three alternative recommendations:

First, an intercepting sewer, which should gather all of the sewage of the city and convey it to the extreme southern end of Lake Michigan, where it was to be pumped into the lake. At the same time all the water works intakes were to be removed to the northward, thus divorcing the source of supply from the cause of the pollution.

Second, an intercepting sewer as in the first plan, its effluent to be pumped on to lands to be used as a sewage farm. The cost of this second plan was given as about $75,000,000 and the annual maintenance at about $2,000,000.

Third, the cutting of a channel connecting Lake Michigan, with the Illinois valley watershed. Into this channel all of the sewage of the city was to be directed. The third plan on an enlarged scale has been carried out by the construction of the Chicago sanitary canal. Lake water was first turned into this canal on January 17, 1900. The intercepting sewers which are designed to bring into the canal the sewage which would otherwise naturally still flow into the lake from the eastern edge of the city, are now under construction, and in the course of a year most of them will be practically completed. * * *

(See II 58.)

Chicago sanitary canal was constructed by special taxation under a charter from the state. Its maintenance and operation are not entrusted to the water department. The whole undertaking was carried out primarily for the purification of Chicago's water supply, and the sanitary canal and the intercepting sewers which are tributary to it, are in large measure just as much an essential part of the water works system as a filtration plant or any other purification works would ordinarily be.

Cribs and Tunnels

See plates II and III (not reproduced here).

In 1905 the committee of twenty of the National Board of Fire Underwriters made an exhaustive investigation of the water works system of Chicago. Part of this report is attached hereto, as Exhibit 5, and on pages eight and nine will be found a good description of Chicago's five cribs and of the tunnels connecting them to the several pumping stations. Exhibits I and II also contain a number of interesting references to these cribs and tunnels, so that it is not thought necessary to do more here than to refer to these reports. (These exhibits not reproduced here.)

Pumping Stations.

Plates IV and XIII, inclusive, are photographs of Chicago's ten pumping stations. Plate XIV shows in tabulated form the mechanical equipment at each station on January 1, 1906. Plate XV shows the essential details of operation of the stations for the year 1905, and plate XVI gives their operating cost for the same period. Exhibits I to V, inclusive, contain further reference to the pumping stations, so that the following notes are intended only to give such information as is called for by the schedule, and as may not be found fully set forth in the other papers referred to. (But little of the matter contained in these exhibits reproduced, and none of the plates are reproduced.)

The conditions in which the engines and boilers are kept and the general appearance of the interiors of most of the pumping stations are such as to give the impression that the chief engineers at the stations are competent men, and this impression is confirmed by personal intercourse with them. Regular daily reports covering fairly well all the essential details of the operation of the pumping stations are required from each chief engineer, and since the close of 1905 Mr. Walter A. Shaw, acting city engineer, has prepared a new and improved form of report for this purpose. See H 16, H 85, H 165 and plates XV and XVI. * * *

See H 129 and 130. See H 5, H 128 and H 131.

Sanitary Condition of Water Supply.

See H 57, 58, 59 and 61. * * *

Appraisal.

See H 30, H 33, H 122, H 34, H 35, H 36, H 42, H 23, H 26, H 83a and H 44.

For cost of a comparable unit of service, see H 158.

See also H 166 and H 50.

(*Chicago.*) EXHIBIT 6, Extract from report by Mr. W. A. Levering, superintendent of division of water pipe extension.

This extract, so far as the material has not been embodied in the answers to the specific inquiries H 94 and H 44½ (fire cisterns), is as follows:

Distribution System of Water Mains.

The distribution system of water mains of the city of Chicago is one of the largest single water pipe systems in the world. It consists of upwards of two thousand (2,000) miles of water pipe spreading out over an area of more than two hundred square miles. It is all interconnected into one great system, there being no high pressure domestic systems as in most other cities for the reason that the city is practically level. The pressure is maintained throughout the system by eight large pumping stations ranging in capacity from thirty to eighty million gallons of water per day, and by three minor stations. Four of the large stations are situated along the lake front, and the other four are located from one and a half to five miles inland. These eight stations take their water supply from water tunnels running out into Lake Michigan, and connecting up with five intake cribs, which are from two and a half to four miles distant from the shore line. The water in the tunnels * * * flows to the pumping stations by gravity, where it is pumped into the mains under pressure. Large trunk mains radiate from the four pumping stations along the shore line, supplying water to the territory two or three miles inland, where they are reinforced by trunk mains from the inland pumping stations which take their supply from the tunnels. These trunk mains are all interconnected, so that if any station is partially disabled the necessary supply and pressure can be maintained from the other stations. The water flows through the large trunk mains to the smaller mains, and thence through the house service or factory service, finally reaching the consumer. If a consumer takes water near a pumping station, he will probably have no trouble from lack of pressure, but if he is a long distance from the pumping station, he will quite naturally suffer first from this cause. In order to facilitate the flow of water and increase the pressure throughout the system, reinforcements to the trunk or feeder mains are being designed to carry water with as little loss in pressure as possible to every section of the city.

The water pressure at the pumping stations varies somewhat, ranging from thirty to sixty pounds. In one instance the water leaves the station under sixty pounds pressure, and is finally delivered to the consumer, eleven miles away under ten pounds pressure. The delivery of water for long distances is difficult and expensive, and the common belief that the use of water should be unrestricted is an erroneous one.

All water mains are made of cast iron, weighing in excess of Class "D" of the New England water works standard, which requires a test pressure of three hundred pounds per square inch. The cast iron pipe is always inspected at the foundry by a representative of the city. Beginning with 1906, all water pipe when laid will be subjected to a pressure of one hundred pounds. The depth of cover for water mains laid in the city of Chicago ranges from 1½ to 5½ feet. Smaller mains from which service pipes are taken are generally laid at a depth of 5½ feet, when the surface of a street is at established grade. If the surface of the street is below grade, then the pipe is laid 5½ feet below the surface. This guarantees a protection from frost, which sometimes penetrates the ground to a maximum depth of five feet. A complete record of all water mains is kept in atlases of a scale of 200 feet to the inch, which show the size and location of mains, hydrants, valves and fire cisterns, and the date of their installation. These maps are all strong, well bound canvas back books, kept on file in the office for constant reference. As soon as any pipe lines or extensions are completed, or any changes made, they are immediately recorded in the proper atlas books, so that a complete and up-to-date system of records of pipe lines is always at hand.

Water Service Pipes.

Prior to the passage of the amendment of the ordinance of July 5, 1905, covering the installing of water service pipes, all pipes were installed and maintained from the mains to the buffalo-box by and at the expense of the interested property owner. On that date an ordinance was passed requiring the work to be done by and at the expense of the city of Chicago. This comprehended the expenditure of a large sum of money, for which no provision was made by appropriation, so that the city was unable to immediately comply with the full requirements of the ordinance. However, orders were issued that the repairs of services should be made by this division, and the expense thereof taken from our appropriation for maintenance and repairs to the water system. This order has been complied with, and 895 service pipes were repaired at an average cost of $8.73 each. Beginning with 1906, the water service pipes will be installed, as well as repaired, by this division, and although it will greatly increase the work of the division, it is proposed to distribute the work in the various districts and perform the same in the manner now observed in the installation of water mains. The record of service pipes is kept in small atlases, numbering in all about 117 books, each book having 140 pages, accommodating from one to two average city blocks. The records in these books are drawn to a scale of 50 feet to the inch, and show the size of lots, width of streets, accurate location of water mains and services leading into lots, also giving curb stop-box location, and the location of tap or ferrule in main. They also show the size and class of buildings.

Hydrants.

At every street intersection in the city of Chicago there are one or more hydrants, and they are also placed in the center of long blocks. They serve the purpose of supplying water to fire engines, to street sprinklers for flushing streets and sewers, and for supplying water for building construction and other temporary uses. The constant use of hydrants by the great number of miscellaneous users, not including the fire department, causes a considerable additional source of expense for maintenance. A solution of the problem is sought whereby these users can secure water satisfactorily from other sources.

The hydrants throughout the city are of several makes and designs, including the Cregier, Holly, Ludlow, Mathews, Wood, Chapman, Gaskill, Eddy, Morgan and Crane hydrants. The standard hydrant adopted by the city is the Cregier design, and constitutes about 80 per cent. of the total number of hydrants in use. This hydrant is made after a patent issued some twenty-five years ago, and is not entirely satisfactory. Improvements upon it are now being considered. These hydrants are made in the water works shops, which are owned and operated by the city.

Hydrants are generally designated as one-way, two-way or three-way hose hydrants, according to the number of outlets or hose attachments they have, and are connected to the water main in the street by a four inch or six inch water pipe. For most purposes, the two-way hydrant is the more convenient, and generally used throughout the city. The one-way or single nozzle hydrants have a two and a half inch hose connection. The two-way or double hydrants have two two and a half inch hose connections, or have two three and one-half inch or four inch steamer connections. The larger of these two-way hydrants are to be found generally in the downtown or congested districts. The two-way hydrants, with three and a half inch steamer connections are especially designed for the high pressure system. The three-way hydrants have two two and a half inch hose connections, and one four inch steamer connection. The major portion of the latter are located south of Thirty-ninth street.

The Cregier hydrant is not provided with the frost jacket and cannot be removed from its place except by removing bolts from bottom of hydrant. To provide an access to the hydrants a circular brick basin is built around each hydrant's stem, below the sidewalk level. The basin is also used in connection with the protection of the hydrant from frost, and is filled with manure above a wooden platform or false bottom, which is separated about one foot above the hydrant branch, thereby permitting hydrant basin being drained to sewer by four inch tile pipe. The manure is put into the hydrant basins late in the fall. The work requires about two months time just before winter sets in, and was done this fall at an average cost of 92 cents for each basin. In the spring the manure is removed, the hydrant basin thoroughly cleaned, and all hydrants placed in good condition. A systematic inspection is made every fall and spring, when all hydrants are oiled and repaired. This work is done under the direction of the district foreman. During cold weather men are assigned to a definite territory to detect frozen hydrants. In the downtown district during this period the hydrants are tested every day, and in the outlying districts they are inspected every two or three days. After fires all hydrants used are reported and inspected immediately under the direction of the district foreman. Frozen hydrants are usually thawed by hot water. Common salt is also sometimes thrown in to start the thawing. The number of frozen hydrants reported during the winter season is small.

(Fire cisterns, see Note 8 in answer to II 44a.)

Valves

There are now in the city of Chicago about 26,940 valves on water mains, ranging in size from four inches to thirty-six inches. A valve on a water pipe is used to stop the flow of water in the main, either temporarily or permanently for some purpose. They are necessary to cut off the flow in case of a break, to control the flow in order to equalize the pressure in any portion of the system, and are used when connecting new pipe lines to the existing mains. In case it is desired to connect mains without stopping the flow of water, a Smith patent sleeve and valve is used, permitting the main to be tapped while it is under water pressure. In addition to the frequent inspection in connection with their usage, a systematic and complete inspection is made once a year in the fall of all gate valves throughout the entire system to ascertain if they are properly oiled, and in thorough working condition, to detect leakage and to see if valve boxes are clean. This immense task is done under the direction of the eight district foremen. In order that valves may be accessible for repairs and inspection, a circular brick basin is built around them, provided with a cast iron cover on the surface of the street. Whenever a gate valve is closed and the water supply is temporarily cut off, all consumers are notified in the territory affected, and the fire department is notified promptly by the foreman of the district. In important cases a letter from the superintendent of water pipe extension to the fire department follows the telephone message by the district foreman. The spacing of the valves in the city is greater than it should be, particularly in the downtown section. However, this condition has been materially improved, as shown by the number of valves added during the past year to the system.

To further improve the situation, so that in case of accident or repair, not more than one business block or two residence blocks will be without water, an appropriation of ten thousand dollars will be asked. If received, this appropriation will also be applied to installing additional valves on large feeder mains.

Pressure Gauges.

Throughout the city in the low pressure districts, the department has placed continuous recording pressure gauges, which show the variations of pressure in the water mains. These gauges record the pressure upon discs which run for seven days. They are placed in the fire engine houses, where they can be looked after by the fire department. By the use of these gauges, the department is able to know at all times what pressures are being maintained in the mains. This is important as the question of pressures has a direct bearing upon conditions for which the department is responsible. At the present time, ten of these recording gauges have been installed, and others will be installed as appropriation for them is made. The data furnished by the recording gauges is supplemented by pressure gauge readings taken from hydrants.

Leaks and Breaks.

(See H 162.)

A considerable number of leaks and breaks occurred during the year. These were not serious, however, excepting one, which was the bursting of a thirty-six inch feeder main in the vicinity of Eighteenth and La Salle streets under the track elevation at that point, flooding the entire neighborhood and to some extent doing damage to railroad property and buildings in the immediate vicinity. The cause of this break is not definitely known, but indications point to the fact that a small leak occurred in the lead joint. The water, instead of appearing on the surface, probably found its way underground to the sewer, washing the earth from around the joint of pipe, which settled from the jar of trains running every day, causing the break.

The leaks reported and repaired are given as follows:

Joints in mains	2,276
Hydrants	2,898
Private service pipe shut off	646
Private service repaired by owner	714
Private service repaired by city	572
Miscellaneous complaints	690

Important Work Done During Year 1905.

With a view to increasing the water supply and pressure in the north end of Hyde Park, where trouble from low pressure has existed for several years, a new large pump was installed at the Sixty-eighth street pumping station. From this station a thirty-six inch discharge main was laid, connecting to the Hyde Park system. There was also laid about four miles of thirty-six inch pipe from Sixty-seventh street to Sixtieth street, in Sixtieth street from Cottage Grove avenue to Wabash avenue, and in Wabash avenue from Sixtieth street to Forty-third street. In Forty-third and Forty-seventh street about one and a half miles of sixteen inch pipe was laid each from Wabash avenue, distributing the supply from this thirty-six inch main throughout the territory as far east as Cottage Grove avenue. These improvements have increased the supply materially and no complaint of lack of pressure is now received. The laying of about two and one-half miles of twenty-four inch pipe in Austin avenue from Madison street to Twelfth street, and in Twelfth street from Austin avenue to Forty-eighth avenue, connecting with the water supply system at the latter point, gives a reinforcement to the Austin mains from the Central Park avenue pumping station, increasing the pressure and eliminating the danger to the village from its being entirely dependent on the thirty-six inch supply main from the Springfield avenue pumping station. Another section of the city where the water pressure has been extremely low is that which lies southwest of the stock yards district. To relieve this condition one and a half miles of sixteen inch pipe was laid in Forty-seventh street from the twenty-four inch main in California avenue to Ashland avenue, connecting to all intersecting small water pipes. In connection with the installation of the Reidler pump at Chicago avenue pumping station, a thirty-six inch discharge pipe was laid, connecting with existing mains. The deepening and widening of the North branch of the Chicago river by the sanitary district required the removing of the twenty-four inch main on the bottom of the river at Montrose avenue, and the construction of an eight foot diameter tunnel, through which this division laid a thirty-six inch main to replace the twenty-four inch main removed.

Considering the many and varied interests at stake, involving a possible loss of millions of dollars in the case of fire, the most important work done by this division has been the installing of valves in the downtown district bounded by Chicago river on the north, Twelfth street on the south, Chicago river on the west, and Michigan avenue on the east. Prior to the placing of additional valves in this district, in case of repairs to the water mains, it required the cutting off of the water supply from several blocks of business houses, office buildings and theatres. Had a fire occurred when water was shut off from these mains, under the old conditions, it would have been impossible for the fire department to obtain an adequate supply of water and an immense conflagration might have been the result. With the placing of these valves there is no danger to the downtown business district which cannot be covered by fire protection during the repair of a leak in any portion of this district.

A further feature of this installation of valves is the reduction in the cost of repairs, and the insuring the city against loss from damage in case of a break in the mains, which under the old system might have flooded the basements of business buildings before the supply to the section could be cut off.

Austin Acquisition.

On August 4, 1905, the city of Chicago purchased from the Chicago Suburban Water and Light company, for $250,000, that portion of said company's system lying east of Austin avenue, amounting to 22.8 miles of pipe, from four inch to ten inch in diameter, 285 hydrants of the Mathews type, and 136 valves.

The pressure carried prior to the purchase of the plant was 40 pounds domestic and 60 pounds fire pressure. Upon being taken over by the city of Chicago, the domestic pressure in Austin was reduced to about 17 pounds, which has since been increased to 23 or 25 pounds by laying large feeder mains into this territory. Fifty-five per cent. of the pipe in Austin is four inch in diameter, with poor reinforcements in the way of connections to larger mains. Under the present pressure, any of the mains are too small to furnish an adequate supply in case of fire, and an appropriation of $20,000 is asked for additional supply pipe to reinforce the four inch mains. The water service pipes, of which there are about 2,702, are mostly ⅝ inch in diameter, connected by one-half inch tap, and with the decreased pressure are insufficient to supply the needs of many of the consumers. Complaints are made daily by residents having insufficient pressure on upper floors. Unless some method is at once used for increasing the pressure, some of these services supplying the larger buildings will have to be replaced, and, as the streets are paved with asphalt, the ultimate cost to the city will be approximately ten thousand dollars. Considerable trouble from frost is also anticipated, in case of severe cold weather, as the Austin system has but four and one-half feet of cover. At the time the city purchased the system, some of the streets in the territory bounded by Austin avenue, Augusta street, Fifty-second avenue and Chicago avenue, were being paved and graded, so that in some cases the pipe was only covered about two to two and one-half feet, leaving but little covering on the services. If the services should freeze, this would be the source of considerable additional expense for maintenance. Electrolysis, a serious form of corrosion which has given trouble in Chicago, is the electrolysis which is caused by return currents from electric railways. The currents should return through the rails and other circuits provided, but as these are not always thoroughly insulated and bonded, a portion of the current passes through the earth to that sub-structure which forms the easiest channel for the current to return to the generating station. As the iron water pipe is near to the street car tracks, the current finds its way to it first, then it flows along the pipe with more or less resistance until it reaches a neighborhood where the rails or some other conductors are of a lower potential than the water pipe, this being usually in the vicinity of the power house. The current then leaves the pipe, and in doing so sets up corrosive electrolytic action. Such action takes place only where the current passes from the pipe to the ground, and not vice versa. Slight currents do not affect the pipe, but where sufficiently strong to set up electrolytic action a constant eating away of the pipe is in progress, and an opening in the water mains or service is the result. This corrosion takes place so rapidly in some cases that the pipe is practically eaten through in three or four years. This electrolytic action has been going on quietly for a long period of time. Evidence of this is furnished by the appearance of leaks on the surface. To investigate this matter during the coming year, a systematic survey will be instigated throughout the entire city to ascertain the districts most affected by this, and to fix the responsibility for the damage resulting from this destruction.

Removal of Pipe Under Track Elevation.

The serious break in the thirty-six inch main at La Salle and Eighteenth streets (hereinbefore referred to) has again called attention to the fact that all mains under track elevation, where same are not placed in subways, should be removed to streets where only the average amount of filling would be over same. This matter was especially mentioned in the report of 1902, but at that time no action was taken towards the replacing of these mains, and as there are several such cases in the city, an appropriation of fifty thousand dollars has been requested from the finance committee for the year 1906, in order that immediate steps may be taken to the end that there can be no recurrence of the conditions met with in repairing breaks similar to that mentioned above.

Recommendations for 1906.

Laying additional large feeder mains in low pressure districts; connecting all "dead ends" wherever possible for better circulation about system; laying pipe in Austin to insure supply for fire protection; placing additional valves throughout the system; improving Cregier hydrants and valves to obtain the best results from their usage; providing a substitute for hydrant to be used by contractors and sprinklers; improving pipe and district yards and purchasing additional land for yards; installing more pressure recording gauges; making an electrolysis survey; removing pipe from track elevations.

Cleveland. Supplementary report.

The engineer's supplementary report on Cleveland, so far as not embodied in the answers to the questions in the schedule, is as follows:

General Description.

The city of Cleveland lies on the southeast shore of Lake Erie, and on the east and west bank of the Cuyahoga river, which flows northwesterly in a very tortuous channel through the central portion of the city. The ground rises abruptly from the lake shore to an elevation of about eighty feet, forming a plateau which extends parallel to the shore, and on which the larger part of the city is built. For half a mile or more, from the edge of the plateau, the ground lies almost level, except where it is cut through by the river, and then rises with the gradually increasing slope to hills some four hundred feet high to the south and southeast. Plate I shows the topography of the city (not reproduced). The business center of the city lies half a dozen blocks northeast of the river, and about the same distance southeast of the lake front. The best residence districts lie to the northeast and to the southwest, and in a territory of more recent development, on the high ground to the eastward.

The city takes its entire water supply from Lake Erie. There are two cribs, known as the East Side crib and the West Side crib respectively. On account of pollution from the shore, the West Side crib is not now used, being held in reserve, so that all of the water now pumped to the city is drawn from the East Side crib. There are three pumping stations; of these, two, the Division street station and the Kirtland street station, are on the lake front. The engines at the Kirtland street station now pump the entire supply, some of it being delivered directly into the low service distributing system of mains, and into Fairmount reservoir, while some is forced to the suction pipe of one of the engines at the Division street station, which gives it the added pressure necessary to deliver it into the first high service system and Kinsman reservoir. The other engines at Division street station are held in reserve.

The third pumping station is located at Fairmount reservoir, and draws water from the Fairmount reservoir for supplying the first high service system and Kinsman reservoir.

Historical Sketch.

An "act to incorporate the Cleveland Water Company," dated January 25, 1833, created "Philo Scovill and his associates for the time being, their successors and assigns," a body corporate and politic by the name of the Cleveland Water company, for the purpose of supplying the village of Cleveland, in the county of Cuyahoga, with good and wholesome water. The capital stock of the company was fixed at $25,000, with the right to increase it to $50,000. By an amendment enacted March 19, 1850, the capital stock of the Cleveland Water company was increased to $100,000, and the company was authorized to make a further increase when necessary to $200,000, and the rights of the company were extended to embrace the territory included within the corporate limits of the city of Cleveland, and county of Cuyahoga. It appears that the original charter was accepted on February 8, 1850, and carried into effect by the subscription of $27,000 to the capital stock, and that subsequently on May 4, 1850, an organization was effected by the election of officers.

Nothing, however, appears to have been done by the Cleveland Water company in the way of constructing a water works plant; and beyond the brief mention of its organization just given, and which was taken, together with most of the other data contained in this historical sketch, from the annual reports of the water department of the city of Cleveland, there is no further allusion to the Cleveland Water company. From such reports as are available, the fact would, therefore, seem to be established that the plant hereinafter described, the construction of which was begun by the city in 1854, was the first to supply water for Cleveland. On February 28, 1853, Mr. Theodore R. Scowden, hydraulic engineer of Cincinnati, Ohio, presented to the mayor and city council of Cleveland, a report on the subject of a complete water works system for the city as it then existed, accompanied by estimates as to the cost of the work. The estimates included an aqueduct from the lake to the engine house, an engine and boiler house with stack, two Cornish pumping engines, each of three million gallons daily capacity; Cornish boilers, standpipe and reservoir tower; and a system of distributing mains; amounting altogether with real estate and contingencies, to $380,766.65. The capacity of plant was based on its having to supply an average of thirty gallons per capita per day to a population of one hundred thousand people.

In the report of a special water works committee appointed at about this time to investigate the subject of a supply of pure water for the city, the population of the city is estimated at about five thousand families. The general plan suggested by Mr. Scowden in his preliminary report was practically approved by the committee, and he was recommended as a desirable person to prepare a final and more thorough report, with detailed estimates. Analyses of water from various sources made in 1852 form the subject of a report by Professor W. W. Mather, which accompanied the report of the committee. Professor Mather recommended the lake as the source of supply. Under the caption "Mode of doing the work," the report of the special committee states that "all experience shows that such undertakings can be carried on more economically by individuals or companies than by municipal corporations, and also better managed after construction."

In this case, however, there was not sufficient inducement at the start for private capitalists, although some had proposed to share the cost with the city. The committee could find in the charter nothing whereby the water works could be a mixed affair. It must be wholly either a public or private work. The committee had knowledge of the existence of a charter, and of the fact that a private company was organized under it, but did not consider itself sufficiently acquainted with the validity of the charter to express an opinion as to its availability as an aid to the city in building its works. The committee's report further states: "One thing is clear to us, the city should by no means allow the power to pass from them of either keeping the control or assuming it at such time as they might think proper upon certain stipulated terms."

In June, 1853, Mr. Scowden submitted another report, which contained, along with recommendations and estimates for other features of a complete plant, comparative estimates of costs of reservoirs of five million gallons capacity, to be erected on one or the other of several different sites. The site at the corner of Kentucky and Prospect streets was recommended by him, and the city's first reservoir, long since abandoned, was built at that point, its site now being occupied by public park. Mr. Scowden's estimate of the cost of the completed works, as recommended in his second report, was $461,314.62. The works included a fifty inch inlet pipe of ⅜ inch boiler plate, extending into the lake three hundred feet from shore, connected at the shore end to an aqueduct four feet by five feet inside diameter and 3,550 feet long, leading to the pump well at the engine house. The outer end of the intake pipe was protected by driving piles around it, so as to form two concentric circles, the space between which was filled with stones to the tip of the pile. The engine house was of brick solidly built, and included a stack and a masonry tower enclosing a standpipe 36 inches in diameter, and 148 feet high. Each of the two Cornish engines had a steam cylinder seventy inches in diameter, with ten foot stroke, and a pump cylinder thirty inches in diameter by eight feet ten inches stroke. The walking beams weighed forty tons each. There were three Cornish boilers, each six feet in diameter, and 28 feet long. The surface of the ground on the reservoir side not being high enough to give the desired height, it was necessary in constructing it to first build up a solid embankment twenty-one feet high over the entire surface. On the plateau thus formed retaining embankments were raised 22 feet higher. The reservoir was designed to hold six million gallons at twenty feet in depth. The distributing system comprised about fourteen miles of pipe, 202 gate valves and 200 fire hydrants. The works were begun on August 10, 1854, and water was turned into the city temporarily September 24, 1856, the event being celebrated with great joy and enthusiasm by the officials and citizens.

While, viewed in the light of later developments, the predictions of those who planned the city's first water works as to continued immunity from pollution of lake water taken only three hundred feet from shore, and as to the maximum estimated consumption, appear to have been, to say the least, sanguine, it is interesting to note that the large and difficult work undertaken by those early engineers seems to have been otherwise admirably planned and well carried out, while its cost was in every case remarkably close to the estimates. The city seems to have been exceedingly fortunate in securing the services of Mr. Scowden.

For the first year or two the running expenses and repairs of the new plant were in excess of the receipts, but in 1858 there was a balance of over two thousand dollars on the right side, which was increased to over five thousand dollars in 1859, so that on January 1, 1860, the total receipts since the date of commencing to run the works had exceeded the total running expenses and repairs for the same period by $1,687.16. In the report of the trustees for the year ending December 31, 1860, we find that there were then 33½ miles of mains, 138 fire hydrants and 49 street reservoirs, or fire cisterns, 25 of them supplied from city mains. The daily pumpage was a little over 700,000 gallons, being 14.11 gallons per day per capita for all the inhabitants, and 101.57 gallons per day per capita of consumers. The purity of the supply having fallen under suspicion, the trustees referred to the analyses made by Professor Mather in 1852, and stated, evidently in all seriousness, that in view of these analyses they could not see the necessity for a new analysis.

In 1865, however, a report of Professor J. L. Cassels, while rather indefinite in some of its conclusions, showed that the water at the existing intake three hundred or four hundred feet from shore was by no means so good as at a point three thousand feet farther out. In the report for 1866, the trustees considered as "a remote possibility" the extension of an underlake tunnel, "to secure purity of the water now occasionally tainted by petroleum, the residuum from the oil refineries located on our rivers and streams, which are adjacent, and thence carried into the lake." In the 1868 report "plans are being prepared for the extension of the inlet in order to obtain a supply of water free from unpleasant or injurious substances." Up to this time, December 31, 1868, the total expenditures for construction and extension of water works plant had amounted to $722,273.35. There were 391 miles of mains, 348 gate valves, and 235 fire hydrants. By early in 1869, surveys for the tunnel had been completed, and during that year the third shaft was sunk. By the end of 1870, this tunnel, which was five feet in diameter, was well under way, 5,710 lineal feet, having been completed from the shore shaft outwards. The crib had been built and towed out, and was sunk in October,

1870. A succession of storms that began just as the crib, only partly filled with stone, was being sunk, caused it to settle unequally and occasioned much expense for repairs.

On December 31, 1872, one year after the date specified in the contract for the completion of the tunnel, only 5,594 feet had been built, leaving 1,006 feet yet to be finished. Much trouble was experienced with bad ground, water, quicksand and gas explosions. The work was finally completed March 2, 1874. Seven men lost their lives in this first tunnel, and a number of others were injured. By July, 1874, a new ten million gallon compound condensing pumping engine locally known as the "Cuyahoga engine" had been installed in a new engine house, known as Engine House Number 2. A new land tunnel was completed on September 9, 1876, to take the place of the old aqueduct from the lake tunnel to the pump well. A ten million gallon Worthington compound condensing pumping engine was ready for use on July 18, 1876, and in 1881, a second and similar engine was installed. By the end of 1880, 402 water meters of different makes and sizes were in use. The population and the daily consumption of water had both begun a more rapid increase. In 1881 the average daily consumption was 13,280,000 gallons, which was equivalent to 76.76 gallons per inhabitant (the population being 173,000), and 162.34 gallons per consumer. In 1883 contracts were let for the eighty-million gallon Fairmount reservoir, and for the thirty-five million gallon high service Kinsman reservoir, as well as for a new boiler house, new boilers and a third ten million gallon Worthington pump for the Division street station.

In 1884 contract was let for a high service pumping station at Fairmount reservoir, and by the end of that year one of the two old Cornish engines, which had been repaired and removed to that point, was ready to begin pumping into the high service system. Fairmount reservoir was put into service November 29, 1884, taking the place of the city's first old reservoir at Kentucky street. On January 18, 1887, a report was presented by Mr. John Whitelaw, superintendent and engineer, covering estimates of $581,840 for a new tunnel seven feet in diameter and 8,800 feet long from crib to pumping station; two fifteen million gallon pumping engines; six tubular boilers, and 24,280 feet of thirty inch cast iron mains. By the end of 1888 the two new fifteen million gallon Knowles pumping engines had been practically completed in the space formerly occupied by the old Cornish engines in engine house Number 1 at Division street. The seven foot tunnel was completed in January, 1891. In report for 1892 recommendations were made for a new pumping station to the eastward, with a crib further out in the lake. In 1893 the Cuyahoga engine was torn out to make room for a fifteen million gallon high duty Worthington engine, which was ready to run by the end of that year. All of this time the water was becoming more and more polluted by the city's sewage.

In July, 1895, a commission consisting of Messrs. Rudolph Hering, George H. Benzenberg and Desmond FitzGerald, expert engineers, with Messrs. M. E. Rawson, chief engineer of water works, and M. W. Kingsley, superintendent of water works of the city of Cleveland, as ex-officio members, was appointed to report on the proposed extension of water works tunnel eastward, intercepting sewer system and river flushing tunnel. The report of this commission, dated February 4, 1896, is attached hereto as Exhibit I (not reproduced). On August 29, 1895, having been asked to make a preliminary report in order that immediate steps might be taken to prepare for construction, the three experts on the commission recommended the extension of one eight foot tunnel, about two and a half miles out into the lake, beyond the West Side crib, and the installation of additional pumping engines, of a total capacity of at least thirty million gallons at Division street station. All pumps, both old and new, were to be so placed that the water in the pump wells could be lowered to a point not less than twenty feet below lowest lake level, with a view to utilizing the full capacity of the tunnels. They furthermore advised against the construction at that time of a new tunnel and pumping station in the eastern part of the city, but recommended that surveys of the lake bottom beyond the West Side crib and borings to the northward along the line of the proposed eight foot tunnel extension should at once be made.

In the commission's final report the three experts repeated the recommendations made in their preliminary report, adding thereto a recommendation that the new intake should be a submerged crib instead of one rising above the water line, and exposed to damage by storms and ice. For the further purification of the water supply they advised the installation of a system of high level and low level intercepting sewers along the shores of river and lake to divert the sewage discharge into these waters to an outfall to be located in deep water, opposite a point on the lake shore ten miles northeast of the mouth of the river. They also recommended the construction of an 18 foot river flushing tunnel, three miles long, through which water to flush and purify the river was to be pumped from the lake into the river at a point far enough up stream to be above the locations of most of the sources of pollution by sewage and factory wastes.

One of the experts, Mr. Hering, was of the opinion that the river flushing tunnel should not be built till the effect of the intercepting sewers could be ascertained, and in this opinion the superintendent of the water works concurred. The superintendent was also of the opinion that a new and independent water works tunnel with a pumping station to be located on the east side should be constructed, either simultaneously with or before the extension of the existing water works tunnels. The chief engineer concurred in the recommendations of the majority of the experts. Both of these ex-officio members of the commission advocated providing temporary outfalls for the intercepting sewers to give relief to those portions of the city where some immediate action seemed imperative. On July 31, 1896, bids were opened for a nine foot tunnel 26,000 feet long from a crib in the lake, near the point recommended by the commission, to a new pumping station to be built on the East Side, and also for an eight and one-half foot tunnel 15,000 feet long extending a little to the west of north from the existing West Side crib.

It was finally decided to build the east side tunnel. Temporary crib Number 1, for construction purposes only, was sunk in position 11,000 feet from the shore shaft, May 27, 1897. The contractors made an unsuccessful attempt to tow the temporary crib Number 2 to its proper place and sink it there, but the crib sunk inside the breakwater instead, and it was then taken out of their hands, and on September 8 was sunk in position by the city 18,800 feet from the shore shaft.

Contract for the permanent steel East Side crib was let December 21, 1896, and work on it was begun April 1, 1897, the crib being sunk in position July 1, 1898. A new twenty million gallon vertical triple expansion Allis engine was put in service at Division street station in October, 1898. Worthington engine Number 1 was removed from Division street station in November, 1900. Foundations for the new East Side station at Kirtland street were finished in the latter part of 1901. A ten million gallon vertical triple expansion Holly engine began pumping to the high service system at engine house Number 2 Division street station on July 12, 1902. The twenty million gallon vertical triple expansion Kilby engine started regular work on low service at Division street on September 22, 1902. The engine house at Kirtland street station was nearly finished in 1902, but boiler house was delayed for lack of steel. The fifteen million gallon Knowles engine Number 2 was moved from Division street to Kirtland in 1903, and Knowles Number 1 followed in 1904. Early in February, 1904, the twenty-five million gallon vertical triple expansion Holly engine, called by the water department Holly Number 2, began pumping to low service at Kirtland station, and on February 28, 1904, its mate, Holly Number 3, was started on the same service. These engines had been contracted for October 16, 1900; one to be finished in 18 and the other in 22 months.

In the meantime, work on the tunnel was being carried on against great difficulties. Bad ground was encountered and explosions of gas developed in the excavations were frequent. The first gas explosion killed nine men; the second eleven. The burning of temporary crib Number 2 cost ten or eleven lives; five men were killed in the blowing up of the shaft at the permanent crib. One foreman fell overboard from the tug and was drowned; another died from caisson disease or "bends," and two inspectors lost their lives in the same way. After the fire in crib Number 2 and the blowing up of the shaft in the permanent East Side crib, the city took the work out of the contractor's hands and pushed it to successful completion under the direction of Mr. George H.

Bennenberg as chief engineer. Even after the city took charge of the work the fatalities did not cease, for an electrician and two laborers were killed by an explosion of gas between cribs 2 and 3, and six or seven men died from bends. Altogether about fifty persons lost their lives in the construction of the East Side cribs and tunnel, and an unknown number were injured.

The last headings of the tunnel were finally joined in December, 1902, but nearly a year longer was spent working inside the tunnel, cutting out brick work in the portion done by contract, and inspecting for and repairing bad work, so that it was not until November 21, 1903, that the tunnel was actually ready for service.

But the Kirtland street pumps were not yet ready for service, and it was February 19, 1904, before the first water was drawn from the new East Side crib. Even then the supply from that source was only partial, the old West Side crib being still in service, and it was not until April 7, or four and one-half months after the final completion of the tunnel, that all the water for the city was taken from the new crib.

In the meantime, typhoid fever resulting from the pollution of the city's water supply by its sewage, had been prevalent since January, 1903, and was greatly augmented by a series of storms and floods occurring in January and February, 1904.

The influence of the quality of the city water supply upon this epidemic is well brought out in the interesting report of Dr. George C. Whipple, consulting engineer; an extract from which is attached hereto as Exhibit XIII (small part of extract only reproduced here).

The intercepting sewers unanimously recommended in 1896 by the commission already referred to, although they had been begun in 1897, were only one-third completed on January 1, 1906. At that time only about a million and a half had been expended on these sewers, and it was estimated that it would require five years more and a further expenditure of three million dollars to complete them. It does not appear that this work was delayed as a result of any insurmountable difficulties, or of any incompetence or neglect on the part of the engineers in charge of it. The necessary appropriations were not provided, and contracts could, therefore, be let for only small sections at a time. The river flushing tunnel has not yet been begun. Had the intercepting sewers been pushed to completion within a reasonable time, and had the pumping plant at Kirtland street been ready for service when the tunnel was finished, much of the typhoid fever of 1903 and 1904 would have been averted. The introduction of water from the East Side crib has greatly improved the quality of the city's supply, and the typhoid rate has decreased correspondingly.

Cribs and Tunnels.

There are at present two intake cribs, one of which, the West Side crib, is held in reserve, all the water supplied to the city being drawn from the East Side crib. The West Side crib was built in 1874. The sub-structure is pentagonal in plan, 54 feet on a side, and is built of pine timbers, oak sheathed on outside from four feet below to seven feet above the water line. The middle well is nineteen feet in diameter, supplied by two inlets four by five feet each. This crib was originally connected to Division street pumping station by a brick-lined tunnel five feet by five feet two inches inside, and 9,155 feet long. In 1891 a second well was cut in the northeast wall of crib to furnish water to a second tunnel seven feet by seven feet two inches inside, and 9,080 feet long. The arrangement of the aqueducts leading from shore shafts to pump wells at Division street station is such that any of the low service pumps at that station may draw from either of these two tunnels.

This crib, shown in plates IV and V (not reproduced) and the tunnels connecting it to shore, are not now used for city supply, having been abandoned as soon as the Kirtland street engines were ready for service in 1904. They are, however, maintained and kept ready for an emergency. The crib is equipped with two rowboats and a life buoy, six life preservers, a hand pump and two fire extinguishers. There is a fifth order government light maintained, and the crew, kept constantly at crib, consists of two men.

The East Side crib, built in 1898, is shown in various stages of construction in plates IX, X, XI, XII, XIII and XIV (plates not reproduced here). This crib consists of two cylindrical steel shells, the outer one hundred feet, and the inner fifty feet in diameter, firmly held together by twenty-four radial water-tight bulkheads, the space between bulkheads being loaded with stone, with a top cover of concrete. Concrete is also used instead of stone for four feet above and four feet below the water line. The steel cylinders rest on a hexagonal grillage of heavy timbers. There are twelve ports, each six by seven feet, to admit water to inner fifty foot well. Inside of this inner well there is a ten foot steel intake shaft, with its open top below the water line to admit the water to the tunnel. The tunnel is nine feet inside diameter and 26,048 feet long from crib to shore shaft at Kirtland street station. An aqueduct 235 feet long and seven feet in diameter connects shore shaft to the four pump wells at this station. East Side crib is equipped with 100 horse power boiler, small hoisting engine, derrick, force pump, life raft, buoys, yawl and a rowboat. There are also a government light and a fog bell and automatic anemometer, and an automatic device for recording the level of the lake.

In addition to the two cribs mentioned, there are two temporary cribs which were used in the construction of the nine foot tunnel, and which have not yet been removed. No water is taken at these cribs, the tunnel having been roofed over beneath them. They serve no useful purpose, and are a source of expense to the city, as the maintenance on them of the lights required by the government necessitates the constant presence of two men on each crib.

These two cribs have not been removed because the bids received so far for their removal have been considered too high. All cribs are maintained in good and neat condition.

Pumping stations. See H 10.

Distributing system. See H 22 and H 82a.

Reservoirs. See H 5.

Quality of the water supply. See H 55, H 60.

Meters. See H 64.

Appraisal. See note on H 39 to H 47.

Cost of a comparable unit of service. See H 158.

Syracuse. The portion of the supplementary report of the engineer, so far as not included in the answers to specific inquiries of the schedule, is as follows:

General Description

The city of Syracuse lies at the southeasterly end of Onondaga lake and on the north and south sides of the Erie canal, which passes through the central portion of the city. The topography of the central part of the city, in which are located the business and industrial interests, is fairly level, lying at an average elevation of about 400 feet above sea level, as shown on Plate I (not reproduced here). Leaving the valleys of the Erie canal and of the small streams which are tributary to Onondaga lake, the ground rises with increasing abruptness to the hills which on three sides surround the city. The highest lands within the city limits are the hills to the southeast, where are located the buildings of Syracuse university. * * *

See H 6.

Historical Sketch[1]

The first settlers in Syracuse depended upon springs for their water supply. Later wells were dug by individuals at their own expense, to be followed by other and larger wells dug at public cost.

On March 27, 1821, the legislature passed an act to supply the village of Syracuse with wholesome water. This act granted to the village the right to use sufficient water for its needs from any of the springs on adjacent lands belonging to the state, and provided for the election of a board of three trustees to carry out the provisions of the act. There appears to be no evidence that the provisions of this act were ever put into effect, the expense of securing an adequate supply of good water seeming to have been the stumbling block.

---

[1] The data from which this sketch is written are taken largely from an interesting paper entitled "Early History of the Syracuse Water Works" by Mr. John Vanner, Chief Inspector of Water, published in the bureau's annual report for 1892.

On April 13, 1825, an act was passed by the legislature "incorporating the village of Syracuse." This act vested all rights, property and powers of the trustees of the water works provided for in the act of March 27, 1821, in the village corporation, and the hypothetical water works proposed in 1821 were placed under the control of the village trustees until 1829. There seems to be no evidence that between 1825 and 1829 the village trustees did any actual work looking toward the securing of a water supply, and on April 23, 1829, the legislature passed an act authorizing the village trustees to convey to Captain Oliver Teall, his heirs and assigns, all rights, property and powers of the village as regards a water supply for the village, "for a period of twenty years."

This act fixed a schedule of water rates, as follows: Private family, $5; boarding house, $10; tavern, $10. It further provided that in case Captain Teall failed to exercise the rights and powers conveyed to him within one year from date, or before April 23, 1830, all rights and powers so conveyed should revert to the village trustees.

Captain Teall, presumably because of the low rates, and probable lack of sufficient consumers, failed to take any steps within the prescribed period towards introducing water into the village, and all rights and powers reverted to the village trustees, and remained vested in them until 1834, when on April 22, as a result of public agitation of the water question, the village trustees again conveyed to Captain Teall all said rights and powers for a period of 35 years.

During the next six years Captain Teall appears to have done nothing towards supplying the village with water. On July 19, 1841, a public meeting was called "to take into consideration the propriety of laying a string of logs from the lock near Almond street, through Almond and Third South (now Fayette) streets, to supply the village with water in cases of fire, and to raise money to pay for the same." Whether this meeting was ever actually held or not does not appear, but on March 29, 1842, the legislature amended former acts and authorized Captain Teall to charge the following rates for water:

Private family, $10; boarding house, $20; tavern or hotel, $40.

Soon after this Captain Teall began work in earnest, and the first string of log pipes was laid late in the fall of 1842 in Almond street, and through East Fayette street early in 1843. In 1846 there was apparently some question as to whether the water supplied was wholesome, and in 1847 Captain Teall and his associates were granted by unanimous resolution of the village trustees the right to supply water from any springs they might select, provided the water so supplied was better than that then being supplied.

On April 15, 1849, the Syracuse City Water Works company was incorporated, with Captain Teall as president, the original incorporators being Oliver Teall, Ira Seymour, John Wilkinson, Hamilton White and Robert Freeman.

The first water used to supply the village of Syracuse came from the base of what was then called Fort (now James) street hill to the east of Lodi street. This was afterwards supplemented by water from wells driven through a thin stratum of red shale rock which lay a few feet below the surface, and from sundry additional springs and brooks in the vicinity, the rights to which are of record in various deeds to the Syracuse Water Works company, or to some of its incorporators.

The first reservoir was built by Captain Teall in 1842 and 1843 on the triangular piece of land bounded by Alice and Fountain streets and Hawley avenue. This reservoir was a small masonry structure, oval in plan, 8 feet by 6 feet, and about 27 feet deep, the upper 12 feet extending above the surface of the ground.

From time to time the water works plant was extended and improved by the water works company until, when it was finally purchased by the city on January 1, 1892, it comprised some forty odd miles of mains, some of which were cast iron and some cement lined wrought iron pipe; 387 fire hydrants; three reservoirs of combined capacity of 225,000,000 gallons; three pumps of a combined capacity of 10,000,000 gallons, and the usual appurtenances.

In the early '80's the Syracuse Water Works company, having apparently reached the limit of its resources, there was much complaint of the quality of water and inadequacy of the service. As a result of much public agitation, a special election was held April 27, 1886, for the purpose of deciding whether the city should issue bonds for municipal ownership of its water works. The vote for municipal ownership was 2,292, and against municipal ownership, 6,268. Those in favor of municipal ownership still continued their efforts, however, and the legislature passed an act "providing for the appointment of a commission to inquire into and investigate the source of a water supply for the city of Syracuse for public, mechanical and domestic uses." On January 21, 1888, this commission was appointed.

The commissioners selected as their engineer Mr. J. J. R. Croes, C. E., who thoroughly investigated 11 different sources of supply, and submitted estimates on the cost of acquiring and utilizing such of these as were considered available. Chemical and bacteriological analyses were made of the water from the various sources.

(See also H 1.) The report of the commissioners, dated February 1, 1889, was accompanied by the report of the engineer and numerous maps and exhibits. (Report, Exhibit 1; also Exhibit 2, address of Engineer William R. Hill on the water works of Syracuse, not reproduced here.)

It is evident that the investigation was thoroughly and carefully conducted, and in a manner which reflects credit upon those who were connected with it. The commissioners unanimously recommended Skaneateles lake as a source of supply, and also that the city of Syracuse should own the water works.

On May 15, 1889, the governor of the state of New York approved a law authorizing the city of Syracuse to take water from Skaneateles lake, subject to the approval of the canal board (the lake being one of the feeders of the Erie canal), and on condition that a majority of votes cast at a special election to be held afterwards should be in favor of city ownership and control of the water works. The special election was held June 4, 1889, and out of a total vote of 12,212 there were 11,302 votes cast in favor of municipal ownership. The mayor subsequently appointed a nonpartisan board of water commissioners. This water board being unable to agree with the water company as to the price to be paid for the existing plant, applied to the Supreme court for a commission to condemn the plant. The Supreme court granted the petition, and the company was awarded the sum of $850,000. The water board took possession of the then existing plant on January 1, 1892, and at once began the work of building the new system. Mr. W. R. Hill, who had been assistant engineer to Mr. Croes in the work of investigation of the sources of supply, was employed by the water board as its chief engineer, and given full charge of the construction work.

The new construction work included 6,419 feet of 54 inch steel riveted pipe in Skaneateles lake, a dam and gate house on its shores, a 30 inch cast iron conduit 19.29 miles long, a distributing reservoir of 121,000,000 gallons capacity near the city, and very extensive enlargements and improvements in the distribution system throughout the city. Under the able and enegretic management of Mr. Hill, this work progressed so rapidly that the city was enabled to begin using Skaneateles water in July, 1894, since which time there has been no other source of supply.

The details of the construction work are given in the paper by Mr. Hill referred to above (Exhibit 2).

For a fuller description of the source of supply, see the answer to H 2.

Submerged Pipe.

In order to take the water from the lake at a point where it could be kept safe against shore-line pollution, a submerged intake pipe was laid from the gate-house at its lower end to a point 6,419 feet southeasterly. This intake pipe is of steel, 54 inch diameter by ⅜ inch thick, and for 4,500 feet of its length was laid in a trench excavated in the bottom of the lake. Its upper end, which lies in 40 feet of water, terminated in a crib fitted with copper wire screens of one inch mesh.

Gate House and Dam.

The old dam, which was nine feet high, was replaced by a new one 17 feet high, with spillway 2 feet higher and foundation six feet deeper than those of the old dam. Six cast iron sluices, built into the masonry of the dam, are fitted with gates to control the water taken to supply the Erie canal. These gates are enclosed in a frame gate house, 9 by 32 feet, built on top of the dam.

Water for supplying the city of Syracuse is admitted through the submerged intake pipe to an intake well 25 feet deep in a handsome masonry gate-house. The intake well is separated by a masonry partition wall from an adjoining screen well, the flow from one to the other being regulated by gates on cast iron sluices built into partition wall. After passing through the screens, the water enters the 30 inch cast iron conduit, the supply to which is controlled by a sluice gate.

Conduit Line

The conduit line of 30 inch cast iron pipe is 19.29 miles in length. The law giving the city the right to take its supply from the lake limited the amount that might be so taken to what would flow through a 30 inch pipe. As a result of this restriction, it was necessary, in order to keep the conduit at all points below the hydraulic grade line, to lay the first two miles of it, as shown on the profile of the conduit, Plate III (not reproduced here), at considerable depth below the surface. This part of the trench was in places 30 feet deep, and lay parallel to the course of Skaneateles creek. The depth of the trench, its proximity to the creek, and the quicksand and water found in the excavation greatly increased the cost and difficulty and danger of construction. The contractor for this part of the work lost so much money that he was unable to finish it, and it was finally finished by the city.

Plates IV and V illustrate some of the difficulties encountered here. Plates VI, VII, VIII and IX are construction views taken farther along the line of the conduit, and show some of the broken and rugged country through which it was laid. (None of these plates reproduced here.) The conduit is fitted with all necessary air valves, blow-offs, gate valves and drains.

As each section was completed, it was carefully tested to pressure 40 pounds in excess of the static pressure, and any leaks, however slight, that developed were repaired, and the section again tested until it was perfectly tight.

In connection with the taking of water from Skaneateles lake and the building of the conduit line, it was necessary to acquire, in addition to the right of way for the latter, a number of water power rights along Skaneateles creek. When terms could not be agreed upon, the lands or rights were acquired by condemnation proceedings.

Woodland Reservoir

This, the distributing reservoir for the present plant, receives the discharge from the lower end of the conduit. It is built partly in excavation and partly in embankment, has a maximum depth of 25 feet, and with the water at this depth has a surface area of 13.57 acres, and a capacity of 121,000,000 gallons. This affords nearly 10 days' storage for the city at the present average rate of consumption. The flow-line of the reservoir is at an elevation 521 feet above the water works datum. Handsome and substantial masonry gate-houses and valve-houses enclose the gates and valves which control the supply to and from the reservoir.

Plates X, XI, XII, XIII and XIV are views giving some idea of the beauty of Woodland reservoir and its surroundings. (Plates not reproduced here.)

For description of the distributing system, see answer to H 22; and for description of the quality of the supply, see answers to H 55, 57, 58, 60 and 61. For comments on the appraisal of the plant, see answers to H 30 to H 47 inclusive.

Indianapolis.

The portions of the supplementary or general report so far as the same are not contained in the answers to specific inquiries in the schedule are as follows:

General Description.

The city of Indianapolis lies in an open prairie country. Its topography is almost level, the land rising very gradually towards the north and east, the highest ground being found in the neighborhood of Crown Hill cemetery on the north and in the newly annexed suburb of Irvington on the east. The west fork of White river flows in a southeasterly direction through the western half of the city, and at a point about 2 miles northwest of the center of the city is joined from the east by Fall creek, one of its principal tributaries. In its upper reaches, White river forms the chief attraction of a fine system of extensive parks and driveways. Plate I (not reproduced here) is a map of Indianapolis, and shows its streets, railways, parks, water courses, and other principal features. The general plan of the city somewhat resembles that of Washington, D. C., the monotony of the streets running north and south, or east and west, being broken by broad diagonal avenues radiating from the imposing Sailors' and Soldiers' monument in the center. The streets are unusually wide. The industrial and commercial district lies south of Monument Circle, and the best residence district to the north. The population has grown from 169,164 by the government census of 1900, to about 220,000, estimated, on January 1, 1906. The present city limits enclose 30.13 square miles, or 19,283 acres. With the exception of the very small residence territory within the limits of the former village of Brightwood, and which still depends for its water supply on the old water works plant acquired by the city when it annexed the village, Indianapolis is supplied with water for fire protection and other public uses, and for domestic consumption, by the Indianapolis Water company. As the Brightwood plant is muncipally owned and operated, it does not come within the scope of this investigation, which will deal only with the plant of the Indianapolis Water company.

(For the character of the soil about Indianapolis, see answer to H 166; and for a similar description of the sources of supply of the water company, the answer to H 2.)

Historical Sketch.

The Water Works Company of Indianapolis, predecessor of the present Indianapolis Water company, was organized October

7, 1869. By an ordinance approved January 3, 1870, the water works company was authorized to lay pipes in the streets of Indianapolis, subject to city laws, and in such manner as not to interfere with the Indianapolis Gas Light and Coke company, and to enforce reasonable rules and regulations against waste, etc. The ordinance specified that the Holly, or direct pressure system of pumping be installed, with a maximum capacity of at least 6,000,000 gallons per 24 hours, and capable of throwing eight fire streams 100 feet high. Steam power was to be used for pumping, and at least two pumping engines were to be installed. The ordinance further provided that the water supplied by the company was to be taken from wells near White river, north of Maryland street, not connected with the river by any other open stream or channel, so that the water should have "natural filtration." This meant that the supply was to be taken from the upper gravel stratum already referred to (II 166).

For further reference to the original ordinance and to subsequent amendments, see laws and ordinances of city of Indianapolis, revision of 1904, 1014 to 1052 inclusive.

The first annual report of the president of the old company for year ending December 31, 1871, states that on that date the company had laid 98,958 feet of cast iron pipe of from 4 inch to 20 inch diameter, 51,606 feet being 6 inch pipe; had set thereon 66 gate valves; and had installed 61 single and 130 double Holly hydrants.

The subsequent annual reports of the water works company reveal the fact that, after struggling along for years in the face of all sorts of difficulties, financial, legal and controversial, the old company was sold out by the sheriff on April 21, 1881, being succeeded by the present Indianapolis Water company.

The principal cause of the failure of the old company appears to have been the continued use of wells by very large numbers of people. It is estimated that there are in the city about 15,000 private wells, used more or less regularly for drinking purposes, and a compilation of available statistics shows that in eight out of fifteen city wards, having a total population of 87,906, there were in 1904 only 5,426 taps taking water from the Indianapolis Water company.

The first pumping station of the old water works company was located on the east bank of White river just south of Washington street. * * * The shallow wells which furnished its supply have long since been condemned and abandoned on account of pollution by drainage from the thickly settled neighborhood, but the old station, enlarged and equipped with additional pumps, is still in intermittent service. The growth of the city and the demand for a supply of water purer and more abundant than could be drawn from its original shallow wells caused the Indianapolis Water company to install a new pumping station and to seek a new source of supply.

The site selected was the point of land between White river and Fall creek and just above their junction. Here was built the open gallery reservoir already mentioned (see H 2), as well as the closed gallery connecting it with a crib in the river, long since abandoned. The sand and gravel with which this crib was covered were intended to provide the "natural filtration" called for by the ordinance. This filtration was by no means efficient and such water as was drawn from the crib or leaked through the wooden gates or bulkheads put in to shut it off had, as might be predicted in these days of more advanced knowledge of filtration, most of the characteristics of the water of White river. The water from the closed gallery was also unsatisfactory, showing evidence of pollution by river water.

In the meantime, driven wells were sunk into the fissured limestone, and an air lift plant was installed to lift the water from these wells into the open gallery reservoir, whence it could be reached by the suction pipes of the Riverside steam pumps, or could flow through the conduit leading to the lower station. For many years these driven wells furnished all the water used, except such ground water as came into the bottom of the open gallery reservoir, and such relatively small amounts of river water as may have from time to time leaked into the closed gallery and thence into the open gallery reservoir.

The deep-well water, though carrying some iron, was excellent from a sanitary standpoint, but the cost of operating the air lift plant was great, and the maximum capacity of the wells was in time almost equalled by the rapidly increasing daily consumption. It was decided to put in sand filter beds, and to furnish filtered water from White river, with Fall creek as a second or emergency source of supply to the filters.

Ground was broken on September 10, 1902. The water was turned into the first filter on September 23, 1904. In the meantime, on March 27, 1904, there was an unprecedented flood in White river and Fall creek. The writer of this report, who happened to be flood bound in Indianapolis on that day, witnessed some of the damage caused by these streams. The White river canal, in its course from Broad Ripple dam, at that time crossed Fall creek in an aqueduct supported by a steel-trussed bridge. Plates II, III and IV show different views of the destruction of the aqueduct; and Plate V shows the handsome new reinforced concrete aqueduct built by the company to replace the old one. (None of these plates reproduced here.) Fall creek burst its levees above the Indiana avenue bridge and flooded the land surrounding the Riverside station, being four feet deep in the Gaskill engine room and in the boiler room. The levee surrounding the open gallery reservoir was burst, and the reservoir was filled with the flood waters. At the same time, many of the streets, sewers and private yards in the city, and a large number of the 25,000 private wells before mentioned, were inundated.

Following this flood there was an unusual amount of typhoid fever, as a result of which a joint commission was appointed to investigate the water supply and sanitary conditions of the city. Mr. George W. Fuller represented the water company, Doctor C. E. Ferguson, the city, and Mr. B. J. T. Jeup, city civil engineer, was added by agreement to the commission.

The report of this joint commission * * * covers fully the situation as it then existed. At the present time most of the changes or improvements which the commission recommended that the water company should make have been completed, and work is in progress on the others.

(For a description of the filter plant, see answer to H 59 and H 60.)

The Washington Street Pumping Station.

This old station, as at present enlarged, is a substantial brick building, containing three pump rooms, one boiler room, and a coal room. There is a four foot brick stack, 125 feet high. Steam is supplied by two 150 H. P. Babcock and Wilcox water-tube boilers installed in 1896, and two 250 H. P. boilers of same make, installed in 1900. All boilers are hand-fired.

The pumping equipment is as follows:

One Holly pump with inclined steam cylinders geared to rotary pumps of a total rated capacity of 4,200,000 gallons per 24 hours, installed in 1870.

One Holly quadruplex steam pump, rated at 6,000,000 gallons, installed in 1872.

Two horizontal pumps of a rated capacity of 6,000,000 gallons each, installed in 1885. The last two pumps are connected to horizontal steam engines as well as to the vertical shafts of three 72 inch turbines, so that they may be driven either by steam power or by water power from the White river canal.

None of these steam pumps can be called modern or economical in fuel consumption. The old geared pump is especially antiquated and inefficient; but all of them can still be relied upon to pump water against the necessary head, and as they are usually held in reserve and are very rarely used, it has not been found necessary to replace them with more modern machinery.

The growth of factories around the station has encroached upon its grounds, and almost hidden it from view, so that little or nothing can be accomplished by trying to beautify the exterior of the building, but the interior is kept clean and well painted, and the machinery is maintained in good working order.

Coal is hauled to the station by wagons, unloaded in coal bins, and thence wheeled to boilers.

The Riverside Pumping Station.

The group of buildings composing the station, the pipe lines and conduits leading to it from the wells and filters, and leading from it to the old lower station or to the city; and the pumping or distributing well and open gallery reservoir, are all shown in plan on Plate XIX (not reproduced here).

The boilers, the Holly-Gaskill pumping engine, and the air compressors are all housed in one building. The Snow pumping engine and the new Davis pumping engine are in separate buildings. All the buildings are substantial and are well kept, and the Snow and Davis buildings—shown on Plates XX, XXI and XXII (not reproduced here)—are unusually handsome structures. A reinforced concrete conduit brings water by gravity from filters to receiving well, whence it may either be drawn by the suction pipes of the pumps or flow on down to the old station. Each of the three pumps is so connected that it may draw either from the receiving well or open gallery reservoir, or both. Steam for the Riverside engines is furnished by eight 250 H. P. Babcock-Wilcox water-tube boilers. There is a self-supporting steel stack five feet in diameter by 150 feet high. The boilers are hand-fired.

The company's officers state that they had the advisability of installing automatic stokers carefully considered by experts, who reported against their installation principally on the ground that the automatic stokers had not the requisite flexibility and could not be forced sufficiently to meet the varying needs of a direct pressure system upon which sudden calls were likely to be made for fire pressure and greatly increased rate of pumping.

Coal cars are set on the company's switch, and there unloaded into small tram cars by the company's Bay City Orange-peel excavator. The tram cars are then pushed along the tracks in front of the boilers.

The pumping engines are as follows:

One horizontal compound condensing Holly-Gaskill steam pumping engine, rated at 12,000,000 gallons.

One Snow vertical triple expansion pumping engine, rated at 20,000,000 gallons.

One Davis vertical triple expansion pumping engine, rated at 30,000,000 gallons.

There are three single-stage air-compressors, and one two-stage compound Corliss compressor, having a combined capacity of 8,000 cubic feet of free air per minute against 50 pounds pressure.

All of this machinery is kept in first rate order. It is not possible to make any statement of duties of engines because of the fact that the same boilers furnish steam to all the engines and to all the compressors. The air-lift plant, as is always the case with this device for raising water, gives a very low duty, but at the time of its installation it was practically the only contrivance in the market by which water could be drawn in large quantities from driven wells. With the completion of the improvements now under way at the filters, the use of the air-lift plant will, except in time of emergency, be almost discontinued.

The total coal consumed in 1905 for all purposes at both pumping stations and at the filter plant is stated by the officers of the company to have been 20,500 tons, averaging about $1.75 per ton.

The extensive grounds around the Riverside station have been transformed by the company into a park. There is a large greenhouse where large quantities of flowers and shrubs are grown, and these in season are set out to beautify the approaches to the handsome pumping station buildings.

For "the cost of a comparable unit of service," see answer to H 158, H 61 and H 162.

New Haven.

The supplementary report on New Haven, so far as the matter has not been embodied in the answers to the specific inquiries in the printed schedule, is as follows:

General Description.

New Haven is situated on the southern edge of Connecticut, and at the north end of New Haven harbor, an estuary of Long Island Sound. Plate 1 (not reproduced here) shows the topography of New Haven and vicinity. The main portion of the city lies low and is nearly level, but the ground rises gradually from the water front to Prospect Hill and Mill Rock on the northeast and Beaver Hill and Pine Rock on the northwest. The city is flanked on the east by a ridge which terminates in the bold and picturesque promontory known as East Rock, 355 feet high, the site of an imposing soldiers' monument and handsome park, and on the west by West Rock Ridge whose southern end is another steep and rocky promontory over 400 feet in height. The highest land within the territory supplied by the mains of the water company is found on Prospect Hill, which is about 140 feet above sea level. The Quinnipiac river flowing south into the harbor just east of East Rock separates East Haven from Fair Haven, and Mill river, just west of East Rock divides Fair Haven and New Haven. West river flowing southerly along the west side of West Rock Ridge separates West Haven from New Haven.

The New Haven Water company now supplies the city of New Haven and the neighboring towns or villages of West Haven, East Haven and Hamden and parts of Orange. The company takes its water from 9 lakes or reservoirs, and the supply is distributed partly by gravity and partly by pumping.

Historical.

Attached hereto as Exhibit I is an historical sketch of the water works, prepared by Mr. David Daggett, secretary, New Haven Water company, which gives a brief outline from the company's standpoint of the series of events, legal and political, which culminated finally in the company's existing contract with the city and amended charter from the state. In so far as the physical features of the plant are concerned, the earliest and for many years the only source of supply was Lake Whitney, the water from which was first pumped to the city by water power on January 1, 1862.

About 1870 the curious old steam pumping engine built by the Yale Iron works was installed in the first steam pumping station at Whitneyville. In 1884 the East Haven pumping station was built on the shore of Lake Saltonstall and the 6½ million gallon compound condensing low duty Worthington engine began to deliver Saltonstall water to the consumers. In 1896 a new engine room and a new boiler room having been added to the Whitneyville steam pumping station, the 10 million gallon compound condensing high duty Worthington pumping engine, with a complete new boiler plant, was added to the equipment of that station. Finally in 1905 a new engine room was built on to the north end of the East Haven pumping station, a complete new boiler plant replaced the then existing one, and the 10 million gallon compound condensing high duty D'Auria pumping engine was put into regular service. In the meantime, the Prospect Hill and East Haven reservoirs and the East Haven standpipe were built, and the lakes which furnished the gravity supply were acquired one after the other; dams were constructed to increase their storage, and mains laid to convey their waters to the city. The plant of the West Haven Water company was bought in 1900, and the Maltby lakes were substituted as a source of supply instead of Lake Phipps, which had been used for the purpose by that company. The distributing system of mains was improved and extended to keep pace with the growth of the city, and finally the fine new filter plant was installed, which early in 1906 began its work of purifying the water from Lake Whitney. The administration of the plant of the company as it now exists is described in a paper prepared by Mr. David Daggett, secretary, New Haven Water company, and which accompanies this report as Exhibit 2. For fuller description of sources of supply see H 2. For the sanitary quality of the water, see H 55. For description of pumping stations, see H 129. The description of the filters is to be found under H 129. The distributing system is described under H 22 and H 85. Proposed extensions are explained under H 131. Quality of water is described under H 55, H 60 and H 61. For cost of "a comparable unit of service," see H 158.

EXHIBIT 1.

THE HISTORY OF THE NEW HAVEN WATER COMPANY.

Written by David Daggett, Secretary New Haven Water Co., November 20, 1906.

The history of the New Haven Water company shows conclusively that the relative advantage of private and municipal ownership of public utilities was as much a burning and debated question in the year 1849 as it is to-day, and that the solution of the problem then, as now, depends upon the individual case in point and not upon any general principle applicable to all localities alike. The question was thoroughly threshed out in New Haven between 1849 and 1854, and twice later, as the facts related below will prove.

The population of New Haven in 1849 was about 21,000, and in that year a charter was granted by the general assembly of the state, incorporating the New Haven Water company and empowering them to furnish and sell water to takers in the city of New Haven. This was not a municipal charter, but was granted upon the petition of private capitalists who recognized the need of a public water supply, and who were willing to risk their money in such an undertaking. They were not capitalists in the sense that that word conveys to-day, but were men of education and position in the community. The influx of foreign labor had not then reached the city, and all debates upon public questions were participated in by an exceptionally intelligent body of citizens who were much interested in the welfare of the city. Once this charter was granted, other equally intelligent members of the community recognized that it might be to the advantage of all to have the public water supply owned by the city instead of by private capital, and debates upon the question of private and municipal control were at once started and public interest aroused. During this time the owners of the original charter did nothing in the way of development, except to open books for subscription to the capital stock of the private company, and seemed to be passive as to the ultimate solution of the question, save that they were unanimous as to the need of some kind of a public water supply. Meantime the discussion went on and finally culminated in a meeting of citizens, called by the mayor in June, 1852, at which a committee was appointed to inquire and report as to the most feasible method of supplying the city with water by a municipal plant. Surveys were undertaken and a report made in March of 1854, when the citizens voted by ballot in favor of a petition to the General Assembly for an amendment to the charter of the city authorizing an issue of bonds to build the works, and another ballot was taken in July in favor of accepting the amendment—as passed in response to the petition—and the citizens thus twice recorded themselves as in favor of owning their own water works.

Commissioners were then appointed, and contracts had been made for the reservoir, when a flaw was discovered in the legislative act, necessitating alterations in order to make a bond issue valid, and during the agitation respecting a petition for an amendment to remedy the matter, decided opposition developed to the city making any such expenditure, and after several meetings and much earnest discussion, a petition was presented to the General Assembly in June of 1854 for a repeal of the act authorizing a municipal plant. This was passed and a new ballot ordered upon the subject, requiring this time a vote of three-fifths of the citizens to make the matter binding. This vote was taken in July, 1854, and showed a decided change in sentiment, for the project was defeated by a majority of 608 votes. This was a very large meeting of the citizens and indicated the great interest taken in the question by everyone resident in New Haven at that time.

In 1859 the original incorporators under the act of 1849, being convinced that a public water supply could be obtained only through private enterprise, again opened their subscription books and solicited capital for the erection of a private plant. The opportunity to become interested in the project was not enthusiastically received, but later in the year contracts were made for the erection of the works for $350,000, and a dam was built across Mill river at the northerly end of the city, and a reservoir built upon Prospect Hill, at elevation 129. Pumping machinery was bought and installed and the water supply of the new company was first distributed to consumers on New Year's day of 1862. From that time to this the works have been in the hands of the original company and have steadily expanded, not only keeping pace with the growth of the city, but, through judicious purchases of land and water rights, provided an ample supply for the full needs of the community for many years to come.

After the failure of the municipal project and the starting of the private plant, opposition developed from two sources—from those who had been advocates of municipal ownership of the plant, and from others who recognized the future possibilities of the earnings of a private plant and who had neglected the opportunity to become participants in the enterprise, and a new company was formed—another private water undertaking—and after repeated efforts a charter was finally obtained, and, to make a long story short, the original company was obliged as an act of self-preservation to purchase the property and franchises of two opposing companies, the Mountain Water company and the Fair Haven Water company, these two opponents having merged their interests, and in 1875 their identity was lost by absorption in the present company. Later, in 1900, the works and franchise of the West Haven Water company came under the control of the present company, and that district is now supplied with New Haven water from the Maltby lake supply, the old West Haven reservoirs being held as a reserve supply. This last was a private company, but their pressure was insufficient, being but fourteen pounds, while, as now connected with the New Haven system, West Haven enjoys from forty-five to fifty pounds.

The water furnished to the city for municipal purposes was under a regular contract with the city at the rate, for the first contract, of $5,500 per year. This contract ran for twenty years, or until 1882. Under its provision the city might purchase the works at any time after ten years from the date of the contract by paying the amount of the capital stock and the interest upon the same at the rate of ten per cent. per annum, less all dividends paid, but no action was ever taken to exercise this option and the contract ran until its expiration.

In 1881 and 1882 there was again considerable agitation and discussion over the question of buying the works under the option before mentioned, and before any new contract was made with the city a vote of the citizens was polled which resulted in a majority of 1,600 against purchase by the municipality, and a new contract was then made, running for ten years, with similar conditions as to purchase as in the first contract, and at the end of this period, or in 1892, the city having failed to exercise its option as to purchase, another ten year contract was made practically identical with the former save in the amount to be paid by the city for water used for municipal purposes. This had varied with each contract, until in 1902, the end of the period covered by the 1892 contract, the city was paying the water company the sum of $20,000 yearly. While this seemed quite a sum compared with the price paid in 1882, careful estimates made by engineers proved that the municipal uses of the city, figured upon the lowest meter rate of the company, were more nearly three times the sum paid.

The ten year periods—or optional purchase periods—had always been of more or less embarrassment to the company in the development of their works, mainly because of the difficulty of enlisting capital for extensions if the call was made at any time near the expiration of one of the periods. Every contract contained the purchase clause, and stockholders were diffident in regard to increasing their interest with the possibility of municipal ownership staring them in the face; and in 1902, when the contract of 1892 expired, this was recognized and a new contract was made, under which the city gives the company a contract in perpetuity, but retains the optional purchase clause at the end of twenty-five years, and has, in addition, the right to supervise the rates charged consumers every five years if they are deemed unfair or inequitable. In return for this contract, the company gives the city free water for municipal purposes in perpetuity.

The relations therefore of the company and of the municipality at this writing—and certainly for twenty years hence, or until the city shall exercise its purchase option in 1927—are intimate and interesting; for, while the works are not the property of the city, the rates charged consumers are under municipal control, the city obtains free water for all public uses, the optional purchase clause is retained, and the company, insured against purchase for a fairly long term of years, can proceed to extend and develop its plant without the menace of municipal ownership. The situation is really one of private ownership with municipal control, and at this time—after four years of experience with the new contract—the relations of the company to the city and to the citizens appear all that can be desired.

THE ADMINISTRATION OF THE NEW HAVEN WATER COMPANY

Written by David Daggett, Secretary New Haven Water Co., November 30, 1906

The New Haven Water company is a private company with a capital stock of $2,500,000 of a par value of $50 per share, held at this date by about 900 stockholders. Of these, about 85 per cent. reside in New Haven; the remainder is variously held through division of estates and sales, but over 80 per cent. of the stock is still held in New Haven. There are no mortgage bonds of any kind and but one class of stock—no preferred. In 1903 the company issued debenture bonds to the amount of $500,000 convertible into stock at par between January 1, 1910, and January 1, 1915, at the option of the directors. These bonds are secured only by the credit of the company.

The stockholders elect by ballot each year a board of nine directors who administer the affairs of the company, and who elect from their own number each year a president, vice-president, and treasurer, and also elect or appoint a secretary, assistant treasurer, superintendent, chief inspector, superintendent of the filter, chief pumping engineer, chief sanitary inspector, and an engineer.

The president has immediate charge of the affairs of the company and devotes practically his entire time to its affairs. At present he is also treasurer. The vice-president is not an active officer. The secretary has charge of the office, purchases, collections, and with the president keeps in touch with the general administration. The assistant treasurer has charge of the corporation books and divides with the secretary the details of office administration. All of the above have desks in the general office of the company.

The superintendent has active charge of all the outside work of the company—pipe laying, buildings, care of sheds, rents—and, with the engineer, has oversight of all construction, whether under contract or not. He reports to the general office daily and from there obtains orders for pipe laying and changes in property or buildings. The purchase of tools and smaller supplies is also his care. He appoints an assistant superintendent who has charge of meters and their care and who also oversees the records of the work done and the pay-roll of employees. All labor is engaged by the superintendent in person and he determines the wages paid. The office of the superintendent is separate from the general office, and is connected with the supply yard where the stores are kept; he has the custody of all gates, pipe, hydrants, meters, and, in general, of all articles used in construction, and has his own clerks or bookkeepers.

The chief inspector of the company reports to the secretary, and has under him the staff of regular house to house inspectors. The city is divided into districts—radiating out from the general office fan-shaped—and each inspector is assigned a district and is responsible for all fixtures, excavations, changes in plumbing, and wasting water in his section. The chief inspector goes into all districts, and all inspectors report to the general office every morning and usually twice a day. They are allowed car fares to distant points and work from 8 A. M. to 5 P. M. One of them is detailed to inspect vacancies and uses a bicycle. They are not allowed to quote rates or to collect bills; they simply report what they see. There is also a special inspector in the employ of the company who is unknown to the regular force and who is in a position to report to us monthly every change in plumbing in the entire city. This gives us a positive check upon our regular force. All inspectors have badges and identification cards, but are not in uniform.

The chief sanitary inspector has under him sub-inspectors and patrolmen, and the entire watershed of the company is under constant surveillance. These inspectors are carefully selected; most of them are resident upon the shed they cover and many of them are constables under a state law. They all have a force of laborers under them who are constantly cleaning the sheds. They are acquainted with and visit the residents, and in case of any sickness upon the sheds, report is at once made to the head inspector and by him to the superintendent. The inspectors themselves are on duty seven days a week and in some instances are furnished with a team. All but one—the inspector on the Maltby sheds, which are but two miles from the office—have telephones in their residences which are paid for by the company. The physicians in every town in which a water shed is located are furnished with blanks by the company, and in cases of typhoid or any water-borne disease they fill these out and mail them to the office of the company—or to the town health officer—for which they receive one dollar as a fee. The telephone is always used if possible before the mailing of the blank. If a typhoid case—or a suspected case—is reported, a patrolman is at once stationed upon the premises night and day, the grounds are disinfected and the head inspector knows where all the excreta are placed, where the sink water is thrown, and whatever else is done upon the premises. The inspector keeps in touch with the physician and the health officer, and by rendering assistance to the family makes himself unobjectionable. The disinfection of premises is under a regular course of procedure laid out for us by Prof. Smith of Yale university, and a full supply of disinfectants is always on hand at the superintendent's office and in the distant sections is stored where the district inspector can immediately get at it.

The superintendent of the filter plant has charge of the filter and of the filter laboratory, and the water is tested daily, and reports made to the main office daily, upon printed blanks, of the number of gallons filtered by each bed, loss of head, temperature of raw water and effluent of the filter, turbidity and per cent. removed, bacteria and per cent. removed, alkalinity, sediment, and tests for the colon bacillus. These reports are kept on file in the general office and are open to the inspection of any responsible person. A monthly chemical and bacteriological examination of all the supplies is also made by Prof. Smith, and more frequently in case of heavy rains or if occasion demands it. In general it may be said that no expense is spared to insure the purity of the supplies. A force of men is continually employed at the filters cleaning and managing the gates.

The chief pumping engineer has charge of the pumping stations and has under him competent engineers who run the machinery. He purchases the smaller supplies through the superintendent's office, and with the superintendent regulates the wages paid at the several stations. Careful and detailed records of the pumps, coal consumption, etc., are kept daily and filed at the main office each week. Daily records are also made at each station of the weather, rainfall, height of lakes and reservoirs.

Automatic recording gauges for pressure are kept at several of the fire engine houses through the city and at other points, and these are collected daily and forwarded to the superintendent.

The engineer of the company has his office in the building with the main office, and, while he and his assistants do outside work, his staff is always available for the work of the company. He makes all contracts for construction and supervises the work, draws plans for dams and reservoirs, and has charge of the development of the water sheds.

Of the five supplies distributing water to New Haven, the company own practically all of the flow lines of the lakes and several feet beyond. They own all of the watershed of the Maltby lakes and practically all of Lake Saltonstall and Lake Wintergreen. Whitney Lake has a shed of about 55 square miles, and of this the company owns a large share, but this supply is now filtered. The West River shed is in process of acquisition, and but little remains to purchase.

The undeveloped supplies of the company are the Wepauwaug river, which will eventually be turned into the Maltby system; the Farm river, which will get into Lake Saltonstall by a tunnel lately completed; and an undeveloped shed in East Wallingford and at Prospect, both of which will probably enlarge the Saltonstall and Whitney supplies.

No fishing is permitted in any of the reservoirs; but, from April to October, permits for line fishing in Saltonstall may be obtained without charge at the office. Skating is allowed only upon a portion of Lake Whitney, which has so long been the main skating privilege of New Haven that it is difficult to stop it. The skating season is very uncertain, and while it continues special inspectors are upon the lake at all times. Through existing contracts when the property was purchased, ice-cutting is allowed at Lake Whitney, Lake Maltby—number 1—and for residents near the lakes upon Dawson, Chamberlain and Bethany. During the cutting season the most rigid precautions are taken against pollution and inherited ice privileges are cancelled as fast as possible.

Wages are paid every Monday and salaries once a month. During the present administration—now over nine years—no employee of the company has ever been asked to vote in any particular way, and all of the force, both laboring and office, are engaged and hold their positions strictly upon merit. No person in the employ of the company is engaged for over one year.

Under an arrangement with the N. Y., N. H. & H. R. R. Co., all train closets are locked between New Haven and Cheshire—on the Whitney shed—and between New Haven and Branford on the Saltonstall shed, and dining car refuse is not allowed to be thrown from the trains.

FINANCIAL MATTERS

United States Water Works

(Schedule IV)

By MARWICK, MITCHELL & COMPANY, Chartered Accountants

I—FINANCIAL MATTERS.

I 1. Secure and transmit a printed or written copy of all rate schedules, forms of contracts, schedules and conditions of discounts, rebates, deposits, penalties, etc., so as to show in detail all charges, such as fees for tapping mains, and turning on water, which any consumer might be called upon to pay, as in force at the end of the last fiscal year, which is for Chicago, Cleveland, and Syracuse, December 31st, 1905.

Chicago. Accompanying this report are the following: (1) Revised Municipal Code of Chicago, of 1905. (2) The Thirtieth Annual Report of the Department of Public Works, for the year ending December 31st, 1905.

The rules and regulations prescribed for the management of the water works will be found in the Code, chapters 32 and 71, at the following sections:

Sections.	*Particulars.*
1906-1911	Water Mains.
2379 to 2406	Rules and Regulations.
2407 to 2419	Water Rates.
2420 to 2436	Meter Measurement Rates.
2437 to 2453	Collection of Rates.

Certain of these sections are amended by an ordinance passed by the city council, July 6th, 1906, as shown on pages 706 to 710 of the supplement to the revised code.

(Rates for Chicago taken by J. H. Gray from report by D. H. Maury.)

Frontage Rates.

The following water rates were fixed by ordinance May 1st, 1898. In some particulars the rates have been amended, the rates here given being those in force at the time the investigation was made. *Section 17 of the ordinance (as amended):* "The minimum water assessment on each and every building fronting on any street, avenue or other public highway, in or through which any public water supply is laid, shall be the amount respectively specified hereinafter as frontage rates and for special use of water such rates in addition as are hereinafter named; provided, however, that when the supply of water to any building or premises is wholly controlled by meter, the said building or premises shall be assessed by meter measurement only, irrespective of the number and character of the fixtures or the special uses for which the water may be used: provided further, that in no case shall any building or premises supplied from meter be less per annum than the amount prescribed for such building or premises by frontage rates."

	Frontage Rates Per Annum. Stories in Height of Building.					
Front Width of Building.	*One.*	*Two.*	*Three.*	*Four.*	*Five.*	*Six.*
12 ft. and less...........	$2 50	$4 00	$5 50	$7 00	$8 50	$10 00
Over 12 ft. to 15 ft......	3 50	5 00	6 50	8 00	9 50	11 00
Over 15 ft. to 18 ft......	4 50	6 00	7 50	9 00	10 50	12 00
Over 18 ft. to 21 ft......	5 50	7 00	8 50	10 00	11 50	13 00
Over 21 ft. to 24 ft......	6 00	7 50	9 00	10 50	12 00	13 50
Over 24 ft. to 27 ft......	7 00	8 50	10 00	11 50	13 00	14 50
Over 27 ft. to 30 ft......	8 00	9 50	11 00	12 50	14 00	15 50
Over 30 ft. to 33 ft......	9 00	10 50	12 00	13 50	15 00	16 50
Over 33 ft. to 36 ft......	9 50	11 00	12 50	14 00	15 50	17 00
Over 36 ft. to 40 ft......	11 00	12 50	14 00	15 50	17 00	18 50
Over 40 ft. to 44 ft......	11 50	13 00	14 50	16 00	17 50	19 00
Over 44 ft. to 48 ft......	12 50	14 00	15 50	17 00	18 50	20 00
Over 48 ft. to 52 ft......	13 50	15 00	16 50	18 00	19 50	21 00
Over 52 ft. to 56 ft......	14 50	16 00	17 50	19 00	20 50	22 00
Over 56 ft. to 62 ft......	15 50	17 00	18 50	20 00	21 50	23 00
Over 62 ft. to 67 ft......	16 00	17 50	19 00	20 50	22 00	23 50
Over 67 ft. to 72 ft......	17 00	18 50	20 00	21 50	23 00	24 50
Over 72 ft. to 77 ft......	18 00	19 50	21 00	22 50	24 00	25 50
Over 77 ft. to 82 ft......	19 00	20 50	22 00	23 50	25 00	26 50
Over 82 ft. to 87 ft......	20 00	21 50	23 00	24 50	26 00	26 50

Larger buildings in proportion. The rates other than average rates are not reproduced here.

All basements containing two or more finished rooms, not including the laundry room, shall be deemed and estimated as an additional story.

All buildings with attics containing more than one finished room shall be deemed an additional story.

Residences, flat buildings or family hotels, not containing bath tubs, water closets, urinals or wash-hand basins, shall be charged in addition to the frontage rates for each flat or apartment therein in excess of two occupied by one family, not to exceed twelve persons $3.00.

Bath tubs, water closets, urinals, or wash-hand basins may be added at the following rates:

Bath tubs each per annum..............................	$3.00
Water closets each per annum..........................	3.00
Urinals each per annum................................	1.00
Wash-hand basins with faucets each per annum..........	1.00

Provided one aggregate charge of $7.00 per annum be made against any flat or apartment occupied by a family not to exceed twelve persons, including all children, boarders, employees and servants. No additional charge shall be made for extra bath tubs, water closets, urinals or wash-hand basins with faucets.

The frontage rates for each residence, flat building, or family hotel occupied by more than one family, shall include the use of one bath tub, one water closet and one wash-hand basin without extra charge.

All basements or attics used for business purposes shall be deemed and estimated as additional stories.

In addition to the above scale of frontage rates, for special water fixtures in each dwelling, the rate shall be as hereinafter specified.

Independent vacant lots, not exceeding 25 feet frontage supplied with water through one faucet, shall be assessed not less than $3.00 per annum, and for any additional water fixtures, the same rates as hereinbefore specified for like fixtures.

Cleveland. A copy of the "Ordinances, Rules, and Regulations for the Management and Protection of the Waterworks, as Amended by the City Council, Dec. 21st, 1896," accompanies this schedule, together with the "Annual Report of the Board of Public Service (Waterworks Division) of the City for the Year ending Dec. 31st, 1905." These documents give the particulars of the rates, forms of contracts, schedules and conditions of assessments, rebates, deposits, penalties, etc. Certain rates have been changed since the book of rules and regulations referred to was made up, but the following statement shows the position in 1905.

Schedule of Water Rates, 1900-1905.

Metered.

1900. The rate for water used through a meter was 10 cents per thousand cubic feet. This rate remains unchanged. The minimum rate was $10.00 per year, where the meter was furnished and set by the water department, and $6.00 per year, where it was furnished and set by the consumer. This applied to all meters over ⅝ inch. No ⅝ inch meters were in use until the latter part of 1901.

1901. Same as 1900 until August 24th, when the following minimums were made effective: $2.00 semi-annually where the assessment rate was $7.00 or less per year; $3.00 semi-annually where the assessment rate was from $7 to $10 per year; $4.00 semi-annually where the assessment rate was over $10.00 per year. On meters larger than ⅝ inch, the minimum remained unchanged.

1902. Same as 1901.

1903. Same as 1901 and 1902, except where the assessment rate was $4.00 or less per year, the minimum semi-annually was reduced to $1.25. This amendment was passed Feb. 7th, 1903.

1904. The same as 1903, until Sept. 2d, when the board of public service passed a resolution establishing two minimum rates for ⅝ inch meters, namely, where the assessed rate is $3.50 or less semi-annually, the meter minimum is $1.25. Where the assessed rate is over $7.00 per year, the meter minimum is $2.50 semi-annually. For meters larger than ⅝ inch, the following minimums semi-annually were established:

¾-inch	$5.00
1-inch	6.00
1½-inch	8.00
2-inch	10.00
3-inch	15.00
4-inch	20.00
6-inch	30.00

1905. Same as 1904.

Assessed.

No change has been made in the assessment rate except that where the annual rent was $4.00 or less, the discount of 15 per cent. is allowed. This amendment was passed August 26th, 1901.

Syracuse.

Accompanying this schedule are the following: (a) Rules, Regulations, and Rates, as at Jan. 1st, 1902, and in force at Dec. 31st, 1905; (b) Sixth Annual Report of the Superintendent of the Bureau of Water to the Commissioner of Public Works, for the fiscal year ended Dec. 31st, 1905.

Indianapolis. (No accountant's report was made on the Indianapolis plant.)

New Haven.

By arrangement between the company and the committee, the scope of the examination of this plant was limited. The results "as far as we are able to investigate," are given.

The following documents accompany this schedule: (1) Contract between the City of New Haven and the New Haven Water Company, dated Feb. 17th, 1902. (2) Application for metered service. (3) Rules and Regulations, including annual and meter rates.

The following are the fees for tapping:

½-inch	$4.00
⅝-inch	5.00
¾-inch	6.00

1-inch and over, special rates depending on cost.

I 2. If any of the above schedules, forms, contracts, etc., differed materially from those in force during the last fiscal year, state differences.

No material change, except as noted in I 1, in the case of any plant.

I 3. Have rates fluctuated?

Chicago, Cleveland, and New Haven. No.

Syracuse. Yes.

J 4. Were these schedules, contracts, and rules *strictly* enforced?

Chicago. Yes, practically so.

Cleveland. Yes, except that occasions have arisen when the management used their own discretion.

Syracuse. No. For instance, the following rules were not strictly observed. Rule 3. "Plumbers shall execute a bond in the sum of $1,000 to indemnify the city against loss or damage from defective work." Rule 53. The bureau will not employ a collector. Rule 56. A penalty of 2½ per cent. to be added to metered bills unpaid on the due date.

New Haven. Yes.

J 5. Were extensions to new territory made free, or were they charged for under these rates?

Chicago. The extension of large feeder mains is made free, these mains not being tapped for private supply. The extension of small water mains is made free provided the annual revenue to be derived amounts to 10 cents per lineal foot of the main so laid. Extensions of main are also made by special deposit and by special assessment under Sections 1906-1909 of Chapter 37, Article 11, of the Municipal Code of 1905 as follows:

Water Mains, cost advanced by property owners. "The Commissioner of public works may extend water mains where the owners of the property, or persons desiring such extension, shall advance, and pay into the city treasury, a sum of money equal to the entire cost thereof, and whenever upon a proper survey it is shown that a permanent annual revenue of 10 cents per lineal foot is being derived from such water main, so laid, then such money, so advanced, as aforesaid, shall be repaid to the person or persons so advancing the same, provided, however, if the money so advanced is not paid back within two years, interest at the rate of 4½ per cent. per annum shall be allowed after the expiration of the said two years until paid."

Special Assessment for Water Mains

"Whenever any special assessment shall be collected by or for the city for the purpose of laying or extending any water main within said city, there shall be repaid out of the moneys in the city treasury to the credit of the water fund, to the person to whom the special assessment receipt shall be given, or upon his order, upon production of the original receipt, the amount for which any such receipt was given (less the rebate previously paid, if any, and less 10 per cent. of the amount originally paid, and for which such receipt was given), when from the surplus of the net income from the water rates not otherwise appropriated or pledged, there is in the city treasury sufficient money therefor, and when the city comptroller shall so certify; provided, however, that no such money shall be repaid unless the permanent annual water rates derived by reason of the laying of such water main for which any such receipt was given shall at the time of such proposed repayment, per annum, equal at least 10 cents per lineal foot so laid, and for which such special assessment was made."

Cleveland. Extensions of main were made free. In cases where extensions of main are made at the request of property owners, and the estimated revenue therefrom will not amount to 6 per cent. per annum upon the cost of the pipe, then the department requires the property owners to deposit $1.00 for each foot of pipe so laid. When the annual revenue therefrom reaches an amount equal to the said 6 per cent. per annum, the deposit is returned.

Syracuse. Extensions to new territory were made free, except in the case of a few temporary extensions which were paid for by the property owners.

New Haven. Free as regards street mains.

I 6. Did the consumer pay for damages and repairs to meters and any other appliances furnished by the company or municipality?

Chicago. For about the first six months of 1905 the consumer paid for damages and repairs to meters, although this is evidently contrary to Sec. 2423 of Chapter 71, Article 2 of the Municipal Code. Since then the cost of repairing meters has been borne by the city.

Following are the sections referred to:

Code, 1905, Sec. 2423, Article 2, Chapter 71. "All meters installed in any building, structure, or premises, shall be of a design, type, and size to be approved by the commissioner of public works. Such meters shall be supplied and installed by the department of public works at the expense of the consumer or person owning, or in possession, charge or control of the building, structure, or premises in which such meter was installed. After installation such meter shall be under the sole control of the department of public works, and the expense of any replacement thereof, or repairs thereto shall be borne by the city without further cost to the consumer or person owning, or in possession, charge or control of such premises." An amendment affecting the above, was passed July 5, 1905, as follows: Supplement to Code, 1905, Sec. 2394. " * * * there shall be furnished and installed a water meter for the purpose of controlling and measuring such water supply, which said meter shall be furnished, installed and maintained at the cost and expense of the city." Sec. 2383 (amended) relates to Buffalo and shut-off boxes, which are to be furnished and maintained by the city at its own expense.

Cleveland. No, except in the case of repairs to private meters, or where damage results to meters from hot water backing up into them. (See Sec. 1009, Rules 33, 44 and 45 of "Rules and Regulations.")

Syracuse. Yes. Rule 15 reads: "Any injury to service pipes, street mains, hydrants, valves, valve boxes, or other fixtures, and any damage that may be caused by leakage or flow of water occasioned by such injury, caused by putting in any sewer, drain or other pipe, or by any excavation, embankment, track laying, paving or other construction shall be paid by the contractor doing the work, or by the owner of the premises, or by the person or corporation for whom such work is being done." And Rule 26 provides that "The owner of property into which water is introduced by a service pipe, shall be required to maintain in perfect order, at his own expense, the said service pipe, from the curb cock to his own premises, including all fixtures therein provided for delivering or supplying water for any purpose. And in case such service and fixtures are not so kept in repair, the bureau of water may shut off the supply of water." The actual work of repairing the meters is done by the department. Rule 80 provides that "In case any damage to a street hydrant is done by any person having a permit and taking the water from said hydrant for street sprinkling, or other uses, the holder of the permit shall pay such damage and all costs and expenses that may be incurred by reason thereof, on demand, to the bureau of water, and in case of refusal or neglect to pay the same, his permit shall be revoked."

New Haven. If his fault, he does.

I 7. Did consumer pay for connections with mains?

Chicago. During 1905, the property owner paid for the tapping of the main and ferrule inserted. Since January 1, 1906, however, this cost has been borne by the city.

Cleveland. Yes. (See Sec. 1002, Rule 2 of "Rules and Regulations.")

Syracuse. No.

New Haven. Yes.

I 8. Was any part of the cost of laying pipes and mains paid by consumers or property owners? If so, what?

Chicago. Yes. The consumer or property owner paid for service connections during 1905. Beginning with 1906, the water service pipes will be installed as well as repaired by the city. (For cost of laying mains, see answer to question I 5.)

Cleveland. Yes. The consumers or property owners are charged for service connections and pipes from main to property. (For cost of laying mains, see answer to question I 5.)

Syracuse. Yes. Property owners paid for the laying of service pipes from curb to meter, but the cost of laying mains and the connection from the main to the curb was paid by the water department, except in the case of temporary extensions of mains as referred to in answer to question I 3.

New Haven. No. Company furnishes water at main only. All connections are paid for by the consumer or property owner.

I 9. If meters or any appliances or repairs were supplied free to consumers, state what, and upon what conditions.

Chicago. During 1905 meters were paid for by the consumers. From January 1, 1906, this cost will be borne by the city. (See answer to question I 6.)

Cleveland. Ordinarily meters and renewals were supplied free, except in a few cases where a large meter was required or where the revenue to be derived from the consumption of water would not warrant the setting of a meter (for example, churches.) In all cases where private meters are to be used, the total charges comprising the setting of the meter and a suitable meter vault or box must be paid in advance at the office of the water works.

Syracuse. Meters and appliances are paid for by property owners. The use of wrenches for opening hydrants is free, a deposit of $2.00 being required, which is returned when the wrench is returned to the department.

New Haven. The company owns all meters, which are supplied free to consumers.

Meter Rentals.

For	⅝-inch	meters	$1.00	per	annum
"	¾-inch	"	1.50	"	"
"	1-inch	"	2.00	"	"
"	1½-inch	"	3.00	"	"
"	2-inch	"	5.00	"	"
"	3-inch	"	10.00	"	"

I 10. Were rates reduced or increased between January 1, 1900, and December 31, 1905?

Chicago. There were no changes.

Cleveland. Certain of the rates were reduced.

Syracuse. Certain of the rates were increased.

New Haven. Yes.

I 11. If so, to what extent?

Chicago. ———.

Cleveland. See answer to I 1.

Syracuse. On July 1, 1905, the schedule rate for faucet use for each family was increased from $5.00 to $6.00 per annum. On January 1, 1906, the rate was increased to $7.00.

New Haven. The rates for stables, sinks and closets were reduced, and rates were charged for set bowls and tubs which were not charged for prior to May, 1902, the date of adoption of contract with the city. The extent of these reductions was as follows:

	Old rate.	*Present rate.*
Stables	$6.00 for first horse, and $2.00 for each other.	$3.00 for first horse, and $2.00 for each other.
Sinks	$6.00 for each family.	$5.00 for each family.
Closets	$3.00 each.	$3.00 for first closet, and $1.00 extra for each closet after.

Set bowls and tubs are now charged, but were not charged for prior to May, 1902.

I 12. *Was the reduction voluntary, the result of law or ordinance, or competition?*

Chicago. ———

Cleveland. The reductions were made by resolutions passed by the board of public service and the city council.

Syracuse. The increase was established by the commissioner of public works, and approved by the board of estimate and apportionment, under authority of the charter of the cities of the second class, Sec. 110, namely, "The commissioner of public works has power, with the assent of the board of estimate and apportionment, to establish rates of rents to be charged, and paid annually for the supply of water, or for the benefits resulting therefrom, to be called "water rents," apportioned to the different classes of buildings in said city, in reference to their dimensions, and the ordinary uses of water for the same, and to vacant lots, as may be practicable, and from time to time to modify and amend, increase or diminish such rates, and to extend them to other descriptions of buildings, lots, establishments and uses."

New Haven. Voluntary.

I 13. *If plant has undergone a change from private to public management or vice versa, give rates just before and just after change, with dates.*

Chicago. Public management of the water works was assumed in 1851. The rates current at that time are not obtainable.

Cleveland. The plant has always been under public management.

Syracuse. The plant changed from private to public management on January 1, 1892. The rates which were in force immediately before the change and which were continued by the water board until 1895, will be found under the heading "1885" on pages 29 and 30 of the "Third annual report of the Supt. of the Bureau of Water," a copy of which report accompanies this schedule.

New Haven. The plant has always been under private management.

I 14. Were bills considered as liens against the property or simply as bills against the consumer?

Chicago. Against the consumer.

Cleveland. The bills were considered by the department as liens against the property. (See Sec. 1069, Rule 26, of "Rules and Regulations.")

Syracuse. Bills are liens against the property as provided by the city charter.

New Haven. Against the consumer.

I 15. How were bills collected.

Chicago. Bills are mailed to consumers, who remit or call at the water bureau, collection division, to make payment.

The United States Express Company also makes collections on behalf of the department.

Cleveland. Advertisements were inserted in local papers intimating the due dates of bills. Consumers are then required to call at the water department office, where they obtain their bills, and are expected to make payment at the same time.

Syracuse. The majority of the bills are delivered, while the minority are mailed. The property owners are required to call at the water office to pay their bills. Bills overdue are collected by collectors.

New Haven. Bills are sent by mail. Consumers call at the office with the cash, or send same. All accounts are expected to be paid within 10 days.

If not paid, a notice as enclosed is sent to consumer, then after a reasonable time, if still unpaid, a further notice called "Delinquent Notice," is sent, and if the consumer then does not pay, the inspector who acts as collector makes a call and reports to the office. The secretary uses his discretion as to whether the water should be cut off or not.

I 16. How often were collections made?

Chicago. Meter rates, monthly. Flat rates, semi-annually. Code, 1905, Sec. 2437, Article 3, Chapter 71.

Semi-annual Payment, Districts.

"The water rates or charges as herein, or hereafter established, except where water supply is controlled by meter, shall be paid semi-annually in advance at the office of the department of public works. The semi-annual payments shall cover a period from the first day of May to the 31st day of October, and the 1st day of November to the 30th day of April in each and every year. * * *" Sec. 2433, Article 2, Chapter 71.

Bills to Be Made Out Monthly.

"Where water is delivered through a meter, the bills therefor shall be presented monthly, and if remaining unpaid for 30 days after presentation, the water supply shall be shut off forthwith, and shall be kept shut off until such bill shall have been paid, together with the charge for shutting off and turning on such water. If the water shall be found turned on to such premises without such amount having been paid and without permission from the commissioner of public works, the same proceedings shall be had, and the same penalty imposed as is provided in and by Sec. 2389 of this chapter in cases where water has been unlawfully turned on." The foregoing section was amended July 5, 1905, the words "together with the charge for shutting off and turning on such water" being omitted.

Cleveland. Half-yearly on April 1 and October 1, assessed rates being payable in advance.

Syracuse. Schedule bills are payable semi-annually in advance. Bills for metered water are payable monthly except bills to domestic consumers, who pay monthly or quarterly or semi-annually in advance. Schedule bills for an intermediate period must be paid before the water is turned on. A discount of 5 per cent. is allowed on schedule and semi-annual bills paid on or before the 10th of January and July.

New Haven. May and November for assessed rates. Meter charges are collected either monthly or quarterly, entirely at the option of the company.

I 41. What system of accounts was used during the last fiscal year?

Chicago. There is a lack of concentration of results in the bookkeeping methods in force. While ordinary expenses are shown in considerable detail, yet no detailed construction accounts are carried on the books of the department. No store room account is kept, nor allowance made on the books at the close of the fiscal year for inventory values of stock on hand. Bills are only entered on the books when ready for payment, consequently the liability for unpaid bills is not shown on the books. While the books of the collection division show the revenue from the water rents, the comptroller's books only deal with actual collections, consequently the amount due from this source is not shown on the balance sheet prepared by the comptroller at the close of the fiscal year.

The following is an extract from the report of the chief accountant to the commissioner of public works: "* * * The records in use prior to the fiscal year 1900 consisted merely of books showing the various amounts appropriated by the council to be expended, and the amount of each respective appropriation expended. This method alone was productive of no accounting results, and as a consequence the department has been in ignorance as to the financial condition of its water works, the cost of operation, repairs and renewals, and construction. Further, the absence of ledgers in which capital accounts should be carried, placed it in the position of being unable to produce a balance sheet. * * *"

Cleveland. While some of the accounting methods adopted can be considered good, yet there are certain methods in vogue which are decidedly poor. The methods in use were also such that the accounts did not show a sufficient amount of detail in order to readily prepare the accounts required by this schedule. A store room account was not kept, and the bills for purchases of material, supplies and other expenses were only entered in the books at the time of payment. As a natural consequence of such methods the results shown by the books were subject to many adjustments. Material, for instance, which was originally charged to construction accounts was partly used in repair work without a record of same being made in the financial books, but the amount involved was small. The liabality for bills due and unpaid at the close of the fiscal year is not shown on the books at that date, nor is there shown thereon the amounts due from sundry persons and public departments for work done, these accounts receivable being kept in a memorandum book only until such time as the amounts are paid, when they then come through the regular books of account. These credits do not always occur in the same fiscal period in which the charges were made. In case any of these accounts should prove to be uncollectable, the loss would consequently not appear as a bad debt, the charge never having been entered in the financial books. Such an entry would merely be marked off the "accounts receivable register," and the same remark applies to any allowances made on these accounts. Although inventories of material and supplies on hand at the beginning and at the end of the fiscal year were prepared and valued, the amounts were not entered on the books.

Syracuse. The accounting methods adopted lack concentration of the bookkeeping work. In one office are kept the accounts relating to the details of revenue. In another office in a separate building are kept the details of the expenditure accounts, and in yet another office, the comptroller's office, in another building, are kept the accounts of cash receipts and expenses. Invoices for supplies and materials were charged to operating accounts at the time they were ready for payment, and as a store-room account was not kept, the distribution of the expenses as shown on the books may not be wholly in accordance with the facts. Inventories of the materials and supplies on hand at December 31, 1904, and December 31, 1905, were prepared, but values were not affixed to the various items, and, of course, the books do not show any values for such inventories. A large amount of repair work is done for property owners, but the credit for such work is not shown on the accounts in the books until payment for same is received, which may be months after the completion of the work. The accounts kept in the office which takes charge of the revenue accounts have not been closed periodically to a profit and loss account, but have been carried on continuously with accumulating balances. Owing to the fact that no store-room account is kept, material which has been charged to construction may be used on repair work and no transfer entry made on the books. Otherwise the records are good.

New Haven. The accounts are prepared upon the basis of "receipts and payments," and not "revenue and expenditure." No charge is made for depreciation, but all repairs and renewals are stated to be charged against revenue. In other respects, so far as we are able to learn, the system of accounts is good.

I 18. By whom were the accounts audited?

Chicago. The auditing department of the city government.

Cleveland. The city "department of accounts" makes a partial examination of the accounts of the water department, but that examination does not constitute an audit of the accounts. "The department of accounts" was only concerned to the extent of seeing that the proper headings of appropriation were charged, that payments were not made in excess of the amounts appropriated, and at intervals they certified the cash on hand.

Syracuse. In 1904, by E. DeWitt Mann, public accountant, Kirk Building, Syracuse. Up to the time of our investigation no audit had been made for 1905.

New Haven. Chas. E. Curtis makes an audit twice a year. Mr. Curtis is vice-president of The City Bank of New Haven, the bankers of the company.

I 19. Who paid for this auditing?

Chicago, Syracuse, Cleveland. The city.

New Haven. The company.

I 20. Who selected the auditor?

Chicago. Auditor Louis E. Gosselin was selected by the city comptroller from the civil service list.

Cleveland. The city auditor is elected by the vote of the people. He selects his own staff.

Syracuse. The city council.

New Haven. The directors.

I 21. Was each item charged to the proper account?

Chicago, Cleveland, Syracuse. No.

New Haven. We were not allowed to satisfy ourselves on this matter, but from conversations with the secretary we are of the opinion that each item would be properly charged.

I 22. What provision was there for assuring that each item was properly charged?

Chicago. All bills are revised and audited by the auditing department of the comptroller's division of the city, whose duty it is to see that these are properly charged out.

Cleveland. Requisitions for material stating the purposes for which it was required, were made out by the chief engineer, foreman, or some other responsible party, and were sent to the store keeper, who supplied the material if it was in stock, or else sent an order to the purchasing agent to procure same, if it was not in stock. Transfers from the store room were not given effect to in the financial books.

When bills are received for supplies and material, ordered and delivered, they are checked with the original order and are then marked with the name of the account chargeable. The accounts charged were not always the proper accounts, as is explained in question I 17.

Syracuse. Orders for material are made out and signed by the store clerk and sent to the agent having after be approved by the superintendent. On bills being received, they are checked by the store clerk with the original order and kept in the office.

for approved by and signature of the superintendent and the commissioner of public works. The store-room clerk keeps the records showing the distribution of operating expenses.

New Haven. As the invoices come in they are examined as to correctness. The accounts to which they are chargeable are marked thereon, and they are approved by the finance committee for payment.

I 23. Were the accounts of the particular plant kept separate from all others and from the general accounts of the city?

Chicago. Cleveland. Syracuse. Yes.

New Haven. ———

I 24. Were expenses for the following items charged upon the books of the plant, and included in the financial returns given below?

		Chicago.	*Cleveland.*	*Syracuse.*	*New Haven.*
(1)	Taxes	No.	No.	No.[6]	Yes.
(2)	Accident insurance..	No.	No.	No.	No.
(3)	Fire insurance......	No.	No.	Yes.	Yes.
(4)	Boiler insurance.....	No.[1]	No.	No.	Yes.
(5)	Water used by plant.	No.	No.	No.	No.
(6)	Claims and damages.	Yes.	Yes.	Yes.	Yes, if any.
(7)	Water used in plant and offices.........	No.	No.	No.	No.
(8)	Rental of lands and buildings not owned but used...........	...[2]	No.	Yes.	...[7]
(9)	Interest on bonds...	Yes.	Yes.	Yes.	Yes.
(10)	Interest on liabilities	...[3]	No.	No charge necessary.	Yes.
(11)	Depreciation	No.	No.[5]	No.	No.
(12)	Sinking funds.......	...[4]	No.	No sinking fund.	No.

I 25. When any city officer performed a service for the plant, for example, city treasurer, or corporation counsel, was any part of his salary charged against the plant?

Chicago. Yes. The following arbitrary proportions of salaries and expenses of other departments were charged against the plant under authority of an ordinance of the city passed February 16, 1905:

---

[1] No insurance is carried on the water works boilers, but in the case of the Carter H. Harrison pumping station, used for interception of sewers, boiler insurance is carried.

[2] The department pays rent for space occupied in the City Hall. No rent, however, is paid for the use of the former electric light plant at Indiana avenue used as a repair shop.

[3] Interest on judgments, and interest paid on certificates representing cost of laying water mains paid by property owners, is charged on the books.

[4] The "water loan sinking fund" is carried on the books of the comptroller's office.

[5] The subject of depreciation of the plant, however, is dealt with extensively by the superintendent in his annual report.

[6] Taxes on property outside the city limits are paid by the bureau and included in the accounts.

[7] The company owns all lands and buildings as far as practicable and necessary to protect their own water supply from pollution.

Proportionate amount of salaries and expenses of city attorney's office	$20,000.00
Proportionate amount of salaries and expenses of corporation counsel	11,899.92
90 per cent. of salaries in office of commissioner of public works	15,443.70
90 per cent. of expenses in office of commissioner of public works	4,059.81
75 per cent. of salaries in bureau of maps and plats	17,165.78
75 per cent. of expenses in bureau of maps and plats	807.42
30 per cent. of salaries in paymaster's bureau	2,748.10
30 per cent. of maintenance of paymaster's wagon	19.07
10 per cent. of salary of complaint clerk in bureau of sewers	119.90
40 per cent. of salaries in department of supplies	5,151.62
40 per cent. of expenses in department of supplies	1,260.97
90 per cent. of salaries in city engineer's office	10,142.11
90 per cent. of expenses in city engineer's office	2,002.90
Miscellaneous pay roll in city engineer's office	2,824.65
Board of local improvements, proportionate amount of salaries	7,561.29
Board of local improvements, proportionate amount of expenses	12,165.06
Board of local improvements, proportionate amount of discount	10,243.22
Harbor police and dredging inspectors' salaries	9,521.69

Cleveland. Syracuse. No.

New Haven. No service rendered.

I 26. Were there any other charges which should properly be included in expenses, but which are actually paid from other sources and were not charged to the plant?

Chicago. Proportion of salaries and expenses of offices of city treasurer, comptroller and collector. Electric light (10 arc lamps) in pumping stations, supplied by the electric light bureau. Rent of building at Indiana avenue, belonging to electric light bureau and used as repair shop.

Cleveland. Electric light in offices prior to September 1. Rent of offices in City Hall. Rent of premises used as store room on Lake street. Rent of lot on Fulton avenue belonging to street department. Rent of telephones. Board of public service, salaries of directors. Department of accounts, proportion of salaries and expenses of city auditor and staff. Law department, proportion of salaries and expenses. City treasurer's department, proportion of salaries and expenses.

Syracuse. Expenses of examinations conducted by Dr. May, city bacteriologist. Paving work performed by the department of public works. Proportion of salary and expenses of city counsel. Proportion of salaries and expenses of comptroller, city treasurer, commissioner of public works and city engineer.

New Haven. No.

I 27. Was the income account credited with services to city departments such as water for fire protection, flushing of sewers, street sprinkling and flushing, public buildings, etc.?

Chicago. The income account is not credited with the value of these services.

Cleveland. No credit was given for these services.

Syracuse. No.

New Haven. No; water is free for municipal use. See contract accompanying this schedule.

I 28. Name any other item that should be credited to the income account that was not on the books.

Chicago. Ground rental of land at Indiana avenue, Chicago avenue, and Fullerton avenue, occupied by electric light plants, estimated at 4 per cent. on values as appraised by the city real estate expert, $1,918. Interest on bank balances. The proportion of interest on bank balances obtained by the city treasurer, and applicable to the water department, was not determined by the treasurer. Based on an average cash balance of $800,000, and an average interest rate of 2½ per cent., the amount of interest for the year would be $20,000.

Cleveland. The department also supplied water free of charge to certain charitable institutions and cemeteries. (See answer to question I 30.)

Rental of lot at corner of Pearl and Columbus streets, used by the street department, estimated by first assistant engineer at $60. Accrued interest received on sale of bonds for $250,000 in 1905, $1,315.07.

Syracuse. Board and feed of three horses belonging to other departments of the city, estimated by the management at $350. Work done for other departments, estimated at $756. Land and reservoir used by city as park, rental estimated at 6 per cent. on appraised value, $4,525. Barn used by department of public works, rental estimated at 6 per cent. on appraised value, $240.

New Haven. ———

I 29. Was water supplied free to any one?

In the case of each of the four plants, yes.

I 30. If so, to whom, and upon what conditions?

Chicago. Water was supplied free to city departments, public schools and charitable and other institutions.

Cleveland. To certain city departments, also to charitable institutions and cemeteries, there being restrictions as to the quantity obtainable free. In some cases the charitable institutions used water in excess of the stipulated quantity, and recently the department decided to render bills for such excess quantity consumed. The following is a statement of the estimated consumption of free water during the year.

	Metered gals.	*Unmetered gals.*	*Total gals.*
Public schools	102,513,750	3,100,000	105,613,750
Private and parochial schools	15,139,500	....	15,139,500
Hospitals	104,595,000	....	104,595,000
Orphan institutions and other charities	72,547,000	1,150,000	73,697,000
Public buildings, police stations, fire engine houses, etc.	157,282,500	2,100,000	159,382,500
Cemeteries	20,025,000	150,000	20,175,000
Parks, including fountains	122,220,000	3,000,000	125,220,000
Flushing sewers	....	87,000,000	87,000,000
Cleaning streets	....	50,000,000	50,000,000
Sewer and paving construction	....	10,000,000	10,000,000
Watering troughs	....	6,000,000	6,000,000
	620,249,750	232,540,000	852,789,750

Syracuse. Following is the estimated consumption of "free water," and for what purposes used.

Unmetered.	*Gallons.*	
Flushing streets	38,040,143	
Sprinkling streets	66,541,500	
Flushing sewers	22,080,000	
Public bath	18,000,000	
Watering troughs	218,526,134	
Bridges	39,888,310	
Fountains	168,804,000	
Fire hydrants	15,000,000	
		586,880,087
Metered.		
Schools and school motors	49,147,200	
School motors	14,537,550	
Fire department buildings, city hall, Carnegie library	19,122,000	
		82,806,750
		669,686,837

Say 670,000,000 gallons.

Note. Charitable institutions (including charities and church institutions) are billed at regular meter rates with 90 per cent. discount. The consumption under this head during the year was 70,631,750 gallons.

Free Houses. Directors, secretary, superintendent of company and city.

I 31. What was the approximate value of this free service?

Chicago. The approximate value of this free service as estimated by the department was $715,987.93, as follows:

Fire hydrants (20,794 at $20)	$415,880.00
Sewer pumpage and flushing	45,000.00
Public parks	55,000.00
Track elevation	20,000.00
Street cleaning	25,000.00
Street improvement	5,000.00
City schools	58,206.86
City fire engine houses	2,953.55
City police stations	1,883.47
City baths	2.040.75
City buildings, miscellaneous	3,960.55
Churches and religious institutions	30,123.57
Private schools and colleges	19,401.13
Hospitals	6,589.00
Asylums and homes	8,006.05
Miscellaneous	1.581.50
Department of electricity	15,361.50
	$715,987.93

The quantity of "free water" consumed as represented by the above figures is not obtainable. The amount included above as estimated by the water department to be applicable to the electric light department is $15,361.50. This amount is determined by using the "Frontage rate plan." Reference may be made to page 11 of the schedule of the commission (I 50) submitted by us relating to the electric light plant of the city, wherein it is shown that at the regular meter rates the estimated value of 1,400,000,000 gallons. the minimum amount supplied to the electric light plants would be $59,640.00, which sum is used in the accounts of the electric light department submitted to the commission. Had the electric light plants been charged at cost, the amount would have been $31.276.00.

Cleveland. The approximate value of the foregoing service at 5 1/3 cents per 1,000 gallons. being the rate charged by the water division for water used through a meter, is $47,614.00, as follows:

Public fountains	$6,678.00
Public buildings	8,500.00
Street watering	4,800.00
Miscellaneous	27,636.00
	$47,614.00

Note. It is stated by the engineer, Mr. D. H. Maury, that 27,000,000 gallons of water were consumed during the year on account of fires. The department estimated that at $30 a hydrant per annum, the revenue to be derived from this source would amount to approximately $220.000.00, which amount we have accapital and included in the revenue as shown in the portion of this report headed "Profit and Loss Account."

Syracuse. The approximate value of the foregoing "free service" at 3½ cents per hundred cubic feet, being the city rates on consumption of 57,100 cubic feet and up, equals $30,365.00 as follows:

Public fountains	$7,877.00
Public buildings	892.00
Street watering	4,866.00
Miscellaneous	16,730.00
Total	$30,365.00

The approximate value of the free use of fire hydrants is estimated by the management at $75 per hydrant per annum, equal to $64,725.00.

New Haven. The approximate value of the free service to the directors, secretary and superintendent was $100. The service to the city of New Haven, which has water free under contract therewith, is estimated by the secretary of the company to be of the annual value of $60,000.00.

I 32. To what account was it debited and credited?

Chicago. The collection accounts are debited, and the assessed and metered rates accounts credited with $159,458.53, the entry being written back at the close of the year. The reason for the difference between the values shown in the books and the value estimated above is that the book figure does not include all items of free service.

Cleveland. Entries were not made on the accounts in the books.

Syracuse and New Haven. No entries were made in the books.

I 33. Has the amount been credited on the books and no further attention paid to it, or have bills been rendered with the understanding that they were not to be paid?

Chicago and Syracuse. Bills were not rendered.

Cleveland. Bills have not been rendered to the charitable institutions until recently, when bills for the quantity consumed above the stipulated amount have been rendered with the object of obtaining payment of same.

New Haven. No entry is made in the books.

I 34. Was there a store room account to which materials were charged when purchased?

I 35. What was the system of charging them out to operating accounts when used?

Chicago, Cleveland, Syracuse. No.

New Haven. Yes. Materials as purchased are debited to the account for which they were purchased, that is plant, new services, repairs, etc. When materials are purchased and put into stock they are debited to "Suspense Account," and as used the expense tendent sends a note to the office of what has been used and for what purpose, and the "Suspense Account" is then credited.

I 36. If there was no store-room account, how were materials charged?

Chicago. Bills for materials, etc., were charged direct to operating and construction accounts when passed and approved, and ready for payment.

Cleveland. Materials are charged direct to operating and construction accounts when bills are passed, approved and ready for payment. The bills are then sent to the department of accounts, which issues a warrant on the city treasurer for payment by him.

Syracuse. Materials were charged on the books at the time the invoices were approved and ready for payment.

New Haven. See answer to questions I 34 and I 35.

I 37. If the plant was run at a loss, how was the deficit met?

Chicago and Cleveland. The plants were not run at a loss.

Syracuse. The operations of the plant resulted in a profit.

New Haven. ———

I 38. How did the rate of interest paid by the city compare with the rate paid by private public service companies?

Name.	*Rate per cent. of interest.*	*Amount outstanding.*
Chicago Edison Co.	5	$5,500,000
Commonwealth Electric Co.	5	6,000,000
Chicago & Suburban Water and Light Co.	5	700,000
Chicago Electric Traction Co.	5	650,000
People's Gas, Light & Coke Co.	6	4,900,000
People's Gas, Light & Coke Co.	5	7,900,000
Bonds assumed:		
Equitable Gas, Light & Fuel Co.	6	2,000,000
Chicago Gas, Light & Coke Co.	5	10,000,000
Consumers' Gas Co.	5	4,246,000
Illinois Light, Heat & Power Co.	7	500,000
Lake Gas Co.	6	300,000
Mutual Fuel Gas Co.	5	5,000,000
Calumet Gas Co.	6	250,000
Chicago Union Traction company bonds assumed:		
Chicago West Division Railway Co.	4½	4,016,000
Chicago Passenger Railway Co.	5	1,600,000
West Chicago Street Railroad	5	3,864,000
West Chicago Street Railroad	5	6,136,000
West Chicago Street Railroad Tunnel Co.	5	1,500,000
North Chicago City Railroad	4	500,000
North Chicago City Railroad	4½	2,500,000
North Chicago Street Railroad	5	3,171,000
North Chicago Street Railroad	4½	1,614,000

(NOTE.) The above information was obtained from Moody's Manual, 1906.

The bonds of the City of Chicago are as follows:

Name.	*Rate per cent of interest.*	*Amount outstanding.*
Water loan	3½	$328,200
Water loan	4	5,341,500
Sewerage loan	4	1,658,200
River improvement	4	2,985,500
Village of Rogers Park	5	7,000
Municipal	4	60,000
Municipal	3½	775,000
School	4	760,000
School	3½	135,000
Tunnel	4	100,000
Tunnel	3½	396,000
World's Fair	4	4,270,000
Judgment funding	4	5,250,000
Permanent improvement	4	3,000,000
General corporate purposes	4	2,000,000

Cleveland. Bonds of private public service corporations are as follows:

Name.	*Rate per cent of interest.*	*Amount.*
Cleveland Electric Illuminating Co. gold bonds due October 1, 1937	5	
Cleveland Gas, Light & Coke Co.		No bonds.
Cleveland Electric Railway funded debt	5	$8,976,000
Cleveland, Painesville and Eastern Railroad Co. funded debt:		
1st first mortgage gold bond due April 1, 1916	5	500,000
Debenture bonds due July 1, 1907	6	500,000
Consolidated mortgage gold bonds due October 1, 1918	5	492,000
Cleveland, Painesville & Ashtabula Railroad Co. 20-year gold bonds dated July 1, 1902	5	850,000
Cuyahoga Telephone Co. first mortgage gold bonds due January 1, 1919	5	2,355,000

The bonds of the City, exclusive of the Water Works bonds, are as follows:

Name.	*Rate per cent of interest.*	*Amount.*
Bridge	3	$125,000
Bridge	4	2,137,000
Cemetery	4	130,000
City Hall	4	706,000
City Farm school	4	70,000
Fire department	4	287,000

Name.	*Rate per cent. of interest.*	*Amount.*
Fire department	4½ and 5	$20,000
Flood damage	4	70,000
Electric light plant	5	30,000
Funded debt	4	1,354,000
Giddings Brook	4	50,000
Garbage	4	255,000
Grade crossings	4	750,000
General sewer	5	90,000
Hospital	4	100,000
Intercepting sewer	4	2,504,000
Light	4½	10,000
Market house	4	160,000
Morgana sewer	4	25,000
Public bath house	4	50,000
Park	4	3,680,000
Police	4	225,000
Paving and Intersection	4	450,000
River and Harbor	4	1,250,000
Sanitary	4	110,000
Street opening	4	316,000
Sewer, drain and ditch	4½	60,000
Town Hall	6	1,000
Sewer district	4	3,781,000
Street improvement	4	44,000
Street improvement	5	811,000
Street improvement	4½, 5, 6	400,744
Street improvement (notes)	5	506,080

Syracuse.

Name.	*Rate per cent. of interest.*	*Amount outstanding.*
Syracuse Lighting Co	5	$2,241.000
Syracuse Gas Co. (assumed by Syracuse Lighting Co.)	5	2,107,000
Syracuse & Suburban Railroad Co. first gold	5	400.000
Syracuse & Suburban Railroad Co. consolidated gold	5	150.000
Syracuse Rapid Transit Co. first consolidated mortgage	5	2,500,000
Syracuse Rapid Transit Co. second mortgage	5	611.000
Syracuse Rapid Transit Co. bonds assumed:		
People's Railroad Co	5	750,000
East Side Traction Co	5	250,000

The above information has been obtained from Moody's Manual, 1906.

The bonded debt of the city of Syracuse at December 31, 1905, exclusive of water bonds, was as follows:

Name.	*Rate per cent of interest.*	*Amount outstanding.*
Syracuse Northern Railroad	4	$457,500
Syracuse and Chenango Valley Railroad	4	457,500
Collegiate	4	100,000
High School	3½	400,000
Syracuse School, 1902	3½	192,400
City Hall	3	200,000
Funded debt 1904	4	758,400
Gere and Truant School	3½	60,000
Columbus Park	3½	10,000
Round Top Park	3½	20,000
Belden avenue bridge	3½	14,200
Library site	3½	50,105
Fire department	3½	34,850
Onondaga creek	3½	42,500
Onondaga creek	4	23,750
Harbor brook	3½	11,100
Union Free School, Elmwood	5	1,500
Porter School	4	8,000
Local improvements	4	413,200
Local improvements	3½	84,000
Temporary loan	4½	50,000

New Haven.

The following particulars relate to New Haven city bonds:

Class.	*Amount outstanding.*	*Due.*	*Rate per cent. of interest.*
Bridge bonds	$65,000	1914-16	4
Bridge bonds	290,000	1920-25	3½
Boulevard sewerage	75,000	1906-08	3½
Funding and high school	460,000	1909-24	3½
Library	100,000	1910-19	3½
Funding	323,000	1923-32	3½
Paving	187,500	1906-16	4
Paving	200,000	1907-21	4½
City sewerage	500,000	1910-27	4
City sewerage, 1905	100,000	1925	3½

Q. 69. In the case of municipal plants, was an appropriation made for the plant?

Chicago. Yes. An appropriation was made by the city council, but this was merely as a limitation of expenditures, the actual payments being made from the revenues of the department.

Cleveland. Yes. Under the law of Ohio an appropriation must be made by the council. This appropriation, however, was merely a limitation of the expenditures under the various heads, no actual cash of the city being appropriated for water works purposes.

Syracuse. Yes. But was not payable, or paid in cash by the city to the department, being intended only as an order by the council as to limitation of expenses.

New Haven. ———

I 40. Was it lump sum or in detail?

Chicago. The appropriation, amounting to $5,889,498.78, was in detail.

Cleveland. Definite amounts were appropriated to specific items of expenditure.

Syracuse. Lump sum of $266,000, applied to various heads of expenditure.

New Haven. ———

I 41. What is the amount of the bonds or other liabilities of the plant cancelled since it began operation?

Chicago. $6,551,400.00.

Cleveland. $3,512,000. The sum of $925,000 was shown on the books to the credit of "bonds redeemed account." This amount represents bonds redeemed by the Sinking Fund commission of 1862 during the years from 1879 to 1884. As the sinking fund commissioners do not appear to consider that any such amount is due from the department to them, we have credited this amount to the surplus account.

Syracuse. $20,000.

New Haven. No bonds issued.

I 42. What provision is being made for paying off the bonds when due?

Chicago. Prior to 1904 there were no sinking fund provisions for payment of bonds. In that year a sinking fund to be provided from taxation was commenced, the account being carried on the books of the city comptroller's department.

Cleveland. There are not any sinking fund provisions for the redemption of bonds, refunding bonds being issued for that purpose. The laws of Ohio require a sinking fund to be provided, but this has not been carried out.

Syracuse. None. The issue of April 1, 1901 ($100,000) is being paid off at the rate of $5,000 per annum from the surplus revenue of the bureau.

New Haven. ———

I 43. If there were any items omitted from any of the following accounts, state what, give amounts, actual or estimated, and state reasons why these should be included, and the method of computing all estimates.

Chicago. Taxes on $6,163,760 (being 1/5 of the approximate value of the real and personal property during the year under review, based on the appraised value at December 31, 1905) at 67.93 mills per dollar, being the average of the rates levied during the year, in the several districts of the city, for state, county and city purposes, $418,705.

Fire insurance as under:

	Valuation.	*Rate.*	*Amount.*
Buildings	$710,105	.75	$5,325.00
Pumping equipment	1,451,822	1.00	14,518.00
Other permanent works	55,315	1.00	553.00
Supplies, etc.	317,477	1.00	3,174.00
Office furniture	18,525	1.00	185.00
			$23,755.00

Boiler insurance on 85 boilers at pumping stations, at $30.00 per boiler for 3 years, $850.00. Accident insurance on $500,000 of wages, at 4 per cent., $20,000.00.

Depreciation, based on the life and cost of the depreciable property contained in a new duplicate plant, as follows:

	Cost of depreciable property contained in a new duplicate plant.	*Rate per cent. of depreciation based on life of plant.*	*Depreciation for year.*
Wells	$10,000.00	4	$400.00
Cribs	800,000.00	2	16,000.00
Conduits, aqueducts and tunnels to mains	7,000,000.00	2	140,000.00
Buildings	905,000.00	2½	22,625.00
Pumping equipment	2,870,000.00	4	114,800.00
Standpipes and tanks	14,000.00	3 1/3	466.67
Mains (including valves and boxes)	22,224,000.00	2	444,480.00
Meters	23,000.00	6 2/3	1,533.33
Hydrants (including fire cisterns)	864,000.00	3 1/3	28,800.00
Furniture, fixtures, maps and engineering records, etc.	143,370.00*	4	5,734.80
	$34,853,370.00	2.22+	$774,839.80

The cost of the depreciable property contained in a new duplicate plant, and the rate of depreciation based on the life of the plant, have been ascertained by Mr. W. H. Maury, engineer. Proportion of salaries and expenses of comptroller, treasurer and city collector and their staffs. (The amount applicable as a charge to the operations cannot be satisfactorily determined, but considering the charges already made for the expenses of other departments of the city, no additional charge need be made under this head.)

---

* Inventory value.

Electric light in pumping stations supplied by the electric light bureau free of charge, 70 arc lamps at $70 per arc lamp per annum, being the rate charged various railroad companies, $4,900. Rental of building at Indiana avenue, belonging to electric light bureau, used as repair shop; 4 per cent. on $16,544, the valuation made by city real estate expert, $660.

Cleveland. Taxes on $4,482,855 (being 40 per cent. of the approximate value of the real and personal property including the excess of the current assets over current liabilities during the year under review, based upon the appraised value at December 31, 1905) at $31.70 per thousand dollars........	$142,106.00
1 per cent. on gross earnings.....................	9,205.00
	$151,311.00

Mr. R. C. Wright of the county auditor's office states that the method of ascertaining the assessment valuation used for taxation purposes is not at present on a very stable basis. Speaking generally, he stated that the assessment valuation amounted to about 60 per cent. of the appraised value of all property, real and personal, including the excess of current assets over the current liabilities. Later we received a communication from the assistant county auditor stating that certain private public utility companies in Cleveland were assessed at approximately 40 per cent. of the structural value of their plants, and concludes by saying: "Under these circumstances, it is a reasonable conclusion that if the Cleveland water works were in private hands their assessment would not exceed 40 per cent. of their structural value."

The taxes for 1905, payable in two installments, one-half on or before December 20, 1905, and one-half on or before June 20, 1906, levied on the assessment valuation based on appraisals made the day preceding the second Monday in April, 1905, are as follows:

Name.	*Rate per thousand dollars.*
State of Ohio......................	$1.35
Cuyahoga county	4.95
School board	11.00
Public library	.90
Cleveland city	13.50
	$31.70

Mr. Wright referred us to Mr. L. D. Bothwell, of his office, who examined the books of his department with the view of ascertaining the appraised value of the various pieces of land held by the water works department. It was stated that each decennial period (the last one was the year 1900), an appraisal is made of the land, but that inasmuch as the water works property is exempt from taxation, the values placed on the land of the water works department by the assessors were not accurately and carefully ascertained and were considered too unreliable for use for our purpose.

Fire insurance, as under, based on information supplied to the management by local insurance companies:

	Value.	Rate per cent.		Amount to be charged.
KIRTLAND ST. STA.:				
Boiler house Main engine house	$500,000.00	.30 .80	.55	$2,750.00
Temporary engine house	2,500.00	.90		22.50
Boilers	64,000.00	.30		192.00
Engines	362,000.00	.60		2,170.00
DIVISION ST. STA.:				
Stat'n, while unoccupied Boiler house N. engine house S. engine house Pipe fitting shop	155,000.00	.75 .60 .70 .70 1.25	.70	1,085.00
Boilers	49,000.00	.70		343.00
Engines	355,000.00	.70		2,485.00
FAIRMOUNT STA.:				
Boiler and engine room	52,000.00	.75		390.00
Boilers	4,800.00	.75		36.00
Engines	16,600.00	.75		124.50
Meter testing and repair shop	1,577.77	1.25		19.72
Lake street yard	585.33	1.25		7.32
Office furniture	14,500.00	1.90		275.50
Stock on hand, etc.	200,000.00	.90		1,800.00
				$11,835.38

Say, $11,835.

Boiler insurance on 26 boilers at pumping stations at $25 per boiler for three years, $216.66.

Accident insurance on estimated wages paid as under:

Pumping stations, cribs, reservoirs	$60,000	$0.18	$108.00
Maintenance and repairs to mains, etc.	95,000	2.70	2,565.00
Meter repairing	17,500	1.55	271.00
			$2,944.00

Depreciation based on the life and the cost of the depreciable property contained in a new duplicate plant, as follows:

	Cost of depreciable property contained in a new duplicate plant.	*Rate per cent. of depreciation based on the life of the plant.*	*Depreciation for year.*
Cribs	$450,000.00	2	$9,000
Buildings	980,000.00	2½	24,500
Conduits and aqueducts.	1,590,000.00	1 1/3	21,200
Pumping equipment	1,320,000.00	4	52,800
Distributing reservoirs...	480,000.00	1 1/3	6,400
Mains	7,750,000.00	2	155,000
Hydrants	240,000.00	3 1/3	8,000
Meters	780,000.00	6 2/3	52,000
Other permanent works..	40,000.00	2½	1,000
Office furniture	*11,879.15	10	1,188
Maps, plans, etc........	*75,000.00	3	2,250
	$13,716,879.15	2.43	$333,338

The cost of depreciable property contained in a new duplicate plant and the rate of depreciation based on the life of the plant have been ascertained by the engineer, Mr. D. H. Maury.

Maintenance, Repairs and Renewals. While the amounts shown on the books appear fair charges for the current year in view of the fact that little or no repairs would be required on the Kirtland street pumping station and the crib, which are of recent construction, yet they are much below what might be considered as a fair normal charge on a plant of this description. In this connection it should be noted that the department spent during the year $27,026.62 on repairs to service connections, although these are not the property of the water works, but belong to the property owners.

The amount necessary to increase the charge to a normal amount, as stated by the engineer, is as follows:

Construction at source of supply (cribs)	$2,000.00	
Amount already charged.............	132.78	
		$1,867.22
Buildings (pumping stations)........	12,000.00	
Amount already charged.............	1,485.84	
		10,514.16
Machinery	15,000.00	
Amount already charged.............	7,738.58	
		7,261.42

---

* Inventory value.

Distributing reservoirs, standpipes and tanks	2,000.00	
Amount already charged	992.23	
		1,007.77
Meters	40,000.00	
Amount already charged	32,129.15	
		7,870.85
Mains	70,000.00	
Amount already charged	72,874.44	
		2,874.44
		$76,734.98

Department of accounts, proportion of salaries and expenses of city auditor and staff	*$1,500.00
City treasurer's department, proportion of salaries and expenses	*2,500.00
Law department, proportion of salaries and expenses	*500.00
Board of public service, salaries of directors	*3,000.00
Rent of premises in city hall	*5,000.00
Electric light in offices prior to September 1, estimated on basis of average cost during four succeeding months	1,200.00
Rental of ground on Lake street, belonging to the city, used as a store, estimated by first assistant engineer at	180.00
Rental of lot on Pelton avenue, belonging to the street department, estimated by first assistant engineer at	60.00
Telephone rental, estimated at	708.00

Syracuse. Taxes on $2,750,897 (being the approximate value of the real and personal property during the year under review within the city limits, based on the appraised value at December 31, 1905), at $20.70 per thousand dollars, being the rate for city, state and county purposes, $56,930.

Accident insurance based on rate of 2 per cent. on wages paid. The rate was supplied by Messrs. Bowen and Perry, insurance agents, Syracuse, $1,750.

---

*The above estimates are based on the probable cost to the division of water were it conducted as a distinctly separate department of the city.

Depreciation based on the estimated life and the cost of the depreciable property contained in a new duplicate plant, as follows:

	Cost of depreciable property contained in a new duplicate plant.	*Rate per cent. of depreciation based on the life of the plant.*	*Depreciation for year.*
Office furniture and equipment	$2,554.00*	10	$255
Maps, plans, profiles, etc.	50,365.00*	2	1,007
Construction for storage at source of supply	118,259.68	1 1/3	1,577
Salaries and fees, and miscellaneous expenses for construction work.	80,735.30	1 1/3	1,077
Conduit and aqueducts to mains:			
Conduit line	1,138,533.90	2	22,771
Submerged pipe	101,106.61	3	3,033
Gate house	13,439.66	1 1/3	179
Buildings	19,000.00*	4	760
Distributing reservoirs	417,076.52	1 1/3	5,561
Mains	1,881,290.75	2	37,625
Services	411,356.47	2½	10,284
Hydrants	99,704.50	3 1/3	3,323
Meters	2,247.50	6 2/3	150
Horses	1,500.00*	15	225
Wagons and harness	791.00*	25	198
	$4,337,960.89	2.029	$88,025

NOTE. The cost of depreciable property contained in a new duplicate plant, and the rate of depreciation based on the life of plant have been ascertained by Mr. D. H. Maury, the engineer.

Paving work performed by department of public works, estimated by the management at $150.

The material is supplied and paid for by the water bureau.

Expenses of examinations conducted by Dr. May, city bacteriologist, estimated by the management at $100.

Proportion of salaries and expenses of city counsel's department. estimated by the management at $250.

Proportion of salaries and expenses of comptroller, city treasurer, commissioner of public works and city engineer.

---

* Appraised value of present inventory.

NOTE. The amount applicable as a charge to the operations cannot be satisfactorily determined, but it is considered to be merely nominal.

New Haven. ——

I 44. In construction work, has a detailed record been kept of expenditures, so that the amount spent to date is known?

Chicago. No detailed records are kept.

Cleveland. Detailed construction accounts are carried on the books, the balances at the end of each year being transferred to a general account called "Construction Account."

Syracuse. No. Not since the year 1900.

New Haven. Yes.

I 45. Have records been kept so that it is known that the total cost will exceed the appropriation before the indebtedness for the excess is incurred?

Chicago, Cleveland, Syracuse. Yes.

New Haven. ——

I 46. Coal used during the last fiscal year for fuel.

Chicago. 186,547 tons (2,000 lbs.) bituminous, Indiana and Mixed at $2.5865.

Cleveland. 24,011.05 tons (2,000 lbs.) bituminous, Pittsburgh slack and Ohio slack at $1.244.

Syracuse. No coal used.

New Haven. 2,780 tons (2,000 lbs.) bituminous, Webster and Georges Creek (Ind.) at an average of $4.50.

I 47. What other fuel was used?

I 48. State quantity of each kind.

I 49. State cost of each kind.

Chicago. Used at the pumping stations, intercepting sewer plant, 2,193 tons of bituminous coal at $2.286 per ton.

Cleveland, Syracuse and New Haven. None.

J—CAPITAL STOCK AND BONDS.

J 1. As of date (end of last fiscal year).

Chicago, Cleveland and Syracuse. December 31, 1905.

New Haven. January 1, 1906.

J 2. The plants at Chicago, Cleveland and Syracuse being municipal plants have never issued any stock, therefore questions J 2 to J 10 do not apply.

New Haven. J 2 to J 7, the company's charter authorizes an issue of $5,000,000 of stock. The company has authorized an issue of $4,000,000, and has issued $1,500,000. There is no stock in the treasury. The total amount issued is now all outstanding and has all been fully paid.

J 8. Stock issued:

Date.	*Shares.*	*Amount.*	*Purpose.*
May, 1860, to Jan., 1865	4,887	$244,350	Original Construction.
Jan., 1865, to July, 1874..	7,113	355,650	Extension of works.
July, 1874, to July, 1876..	433	21,650	" " "
July, 1876..............	4,000	200,000	Purchase of Fair Haven Water Co.
July, 1876, to May, 1877.	1,567	78,350	Extension of works.
November, 1880..........	4,500	225,000	" " "
January, 1886...........	5,625	281,250	" " "
December, 1890..........	5,625	281,250	" " "
September, 1895.........	5,629	281,450	" " "
Jan., 1896, to April, 1896	621	31,050	" " "
February, 1901..........	10,000	500,000	" " "
	50,000	$2,500,000	

The stock is $50 par value, and has all been issued for cash.

J 9. Explain how each issue of stock was disposed of, whether private sale, public auction, stock dividend, at par to stockholders, bonus, etc.

All at par to stockholders. When directors wish to issue stock they advise the stockholders by circular, and allot it to them pro rata to their present holding. The last issue was on the basis of one new share for every five held.

J 10. Number of stockholders.

900.

CHICAGO BOND ISSUES.

J 11 to J 21 inclusive.

J 11. Amount of bonds authorized by charter or statute.

Chicago. Under the "Statutes of the State of Illinois," constitution of 1870, Article 9, Sec. 12, "No county, city, township, school district, or other municipal corporation, shall be allowed to become indebted in any manner, or for any purpose to an amount, including existing indebtedness, in the aggregate exceeding 5 per centum of the value of the taxable property therein, to be ascertained by the last assessment for state and county taxes previous to the incurring of such indebtedness. Any county, city, township, school district, or other municipal corporation incurring any indebtedness as aforesaid, shall, before or at the time of doing so, provide for the collection of a direct annual tax sufficient to pay the interest on such debt, as it falls due, and also to pay and discharge the principal thereof within 20 years from the time of contracting the same."

J 12. Amount of bonds authorized by municipality or vote of company. $10,121,400.

J 13. Amount of bonds issued and assumed. $10,121,400.

J 14. Amount of bonds paid. $6,551,400.

J 15. Amount of bonds outstanding. $3,570,000.

J 16. Bonds issued and assumed, $10,171,100, as under:

CHICAGO PROPER.

Date of Issue.	*When Due.*	*Amount.*	*Amount Redeemed.*	*Rate Per Cent. of Interest.*
May 1, 1852....	July 1, 1877.	$272,000 00	*	6
October 1, 1852.	Jan. 1, 1878	128,000 00	*	6
June 1, 1854...	July 1, 1874.	100,000 00	*	6
June 1, 1855...	July 1, 1880	120,000 00	*	6
June 1, 1856...	July 1, 1880	100,000 00	*	6
July 1, 1857....	July 1, 1882.	200,000 00	*	6
July 1, 1858....	July 1, 1882	75,000 00	*	7
July 1, 1861....	July 1, 1882.	75,000 00	*	7
July 1, 1863....	July 1, 1888.	150,000 00	$161,778 48	7
July 1, 1864....	July 1, 1889	225,000 00	214,620 16	7
July 1, 1865....	July 1, 1890	200,000 00	187,484 73	7
July 1, 1866....	July 1, 1890	75,000 00	70,138 21	7
May 10, 1867...	July 1, 1892	800,000 00	776,240 52	7
July 1, 1868....	July 1, 1892.	100,000 00	98,000 18	7
May 10, 1869...	July 1, 1894	800,000 00	775,162 72	7
July 1, 1870....	July 1, 1895.	1,200,000 00	1,167,018 87	7
July 1, 1874....	July 1, 1894.	105,000 00	105,862 62	6
July 1, 1877....	July 1, 1897	250,000 00	262,125 00	6
July 1, 1878....	July 1, 1898.	100,000 00	102,390 00	6
July 1, 1882....	July 1, 1902	222,000 00	224,380 00	3.65
July 1, 1888....	July 1, 1908.	150,000 00	153,980 00	4
July 1, 1889....	July 1, 1909.	225,000 00	231,237 81	3.50
July 1, 1890....	July 1, 1910.	103,500 00	103,500 00	3.50
January 1, 1891	July 1, 1911.	120,500 00	120,500 00	4
July 1, 1892....	July 1, 1912.	923,000 00	923,000 00	4
January 1, 1894	Jan. 1, 1914.	130,000 00	130,000 00	4
July 1, 1894....	July 1, 1914	440,000 00	401,592 00	4
July 1, 1895....	July 1, 1915.	1,482,000 00	1,500,747 92	4
		$9,129,000 00		

These bonds are a lien on buildings, equipment, pipe lines and real estate of the water department, and also against the city of Chicago property.

BONDS ASSUMED.

Village of Lake:

Date of Issue.	*When Due.*	*Amount.*	*Rate Per Cent. of Interest.*
April 1, 1874..........	Jan. 1, 1894.	$107,000 00	7
April 24, 1874.........	July 1, 1894	115,000 00	7
April 1, 1888..........	April 1, 1889	5,000 00	5
April 1, 1888..........	April 1, 1890.	5,000 00	5
April 1, 1888..........	April 1, 1890	9,500 00	5
April 1, 1888..........	April 1, 1891.	10,000 00	5
April 1, 1888..........	April 1, 1892.	9,000 00	5
April 1, 1888..........	April 1, 1893	15,000 00	5
April 1, 1888..........	April 1, 1894	15,000 00	5
April 1, 1888..........	April 1, 1895.	15,000 00	5
April 1, 1888..........	April 1, 1896	15,000 00	5
April 1, 1888..........	April 1, 1897.	15,000 00	5
April 1, 1888..........	April 1, 1898.	15,000 00	5
April 1, 1888..........	April 1, 1899	15,000 00	5
April 1, 1888..........	April 1, 1900.	15,000 00	5
April 1, 1888..........	April 1, 1901.	15,000 00	5
April 1, 1888..........	April 1, 1902.	15,000 00	5
Total..........		$411,000 00	

---

* No records obtainable prior to 1863.

Village of Lake View:

Date of Issue.	*When Due.*	*Amount.*	*Rate Per Cent of Interest*
....	July 1, 1895.	$75,000 00	7
....	July 1, 1904.	23,000 00	5
....	July 1, 1907.	50,000 00	4
Total............................		$148,000 00	

Village of Hyde Park:

**Date of Issue.*	*When Due.*	*Amount.*	*Rate Per Cent of Interest.*
September 15, 1873.....	July 1, 1893.	$30,000 00	7
April 1, 1874..........	Jan. 1, 1894.	23,000 00	7
April 1, 1875..........	Jan. 1, 1895.	322,000 00	7
January 1, 1876.......	Jan. 1, 1896.	9,000 00	7
February 1, 1894......	Jan. 1, 1904.	50,000 00	5
Total............................		$434,000 00	

Total bonds assumed.................................. $993,400 00

All of the above bonds have been paid and retired excepting the $50,000 of 4 per cent. bonds of the village of Lake View, maturing July 1, 1907.

SUMMARY.

Bonds issued	$9,128,000
Bonds assumed	993,400
Total bonds issued and assumed..	$10,121,400

J 17. Explain how each issue of bonds was disposed of, whether private sale, public auction, bond dividend, etc.

All bonds were sold to the highest bidder.

J 18. State amount and character of other funded debts, if any.

Water pipe extension certificates amounted to $339,494.35 at December 31, 1905.

J 19. If funds have been secured from any other sources for the construction and extension of plant, give amount, dates and sources fully.

Funds are secured for extension of the system from property owners by special assessment, or special deposit. Such amounts, or 90 per cent. thereof, are returned when the revenue derived equals 10 cents per lineal foot of the main so laid. (See answer to question I 5.) Surplus revenue is also employed for extension of system and construction of plant.

J 20. What provisions have been made for the payment of liabilities when due?

None.

---

* Bond record not obtainable.

J 21. What provisions have been made for the payment of interest on bonds?

Surplus revenues of the department are depended upon to pay the interest on the bonds.

CLEVELAND BOND ISSUE.

J 11 to J 21.

J 11. Amount of bonds authorized by charter or statute.

Extract from act of the General Assembly of the state of Ohio, amending sections 2835 and 2837 of the revised statutes of Ohio. "The total bonded indebtedness created in any one fiscal year under the authority of this act shall not exceed 1 per cent. of the total value of all property in such municipal corporation, as listed and assessed for taxation, except where an ordinance be passed by an affirmative vote of not less than two-thirds of all the members of the council deeming it necessary to issue bonds in excess of this, when they shall submit the question to a vote of the qualified electors, provided that the net indebtedness incurred shall never exceed 4 per cent. of the total value of the property as listed and assessed for taxation, unless an excess of such amount is authorized by vote of the qualified electors. If two-thirds of the voters voting at such election upon the question of issuing the bonds vote in favor thereof, then and not otherwise the bonds for such excess shall be issued, and tax levied, provided, however, that no township or municipal corporation shall hereafter create or incur a net indebtedness in excess of 8 per cent. of the total value of all property as listed and assessed for taxation. All bonds heretofore issued in good faith under the authority of Sec. 2835, Revised Statutes, as amended April 29, 1902, and April 25, 1904, which at the time of issue were within the limitations herein provided, shall be valid obligations of the township, city, village or other municipal corporation which issued them; and in arriving at the limitations of 8 per cent., herein provided, and of 4 per cent. in Sec. 2835, revised statutes; provided all such bonds, except those excluded by the provisions of Sec. 2835B, revised statutes, shall be considered."

Sec. 2835B, of House Bill 244, provides *inter alia* that the limitations of 1 per cent. and 4 per cent. referred to above shall not apply to bonds issued for the purpose of constructing, improving and extending water works when the income from such water works is sufficient to cover the cost of all operating expenses, interest charges, and to pass a sufficient amount to a sinking fund to retire such bonds when they become due.

J 12. Amount of bonds authorized by municipality or vote of company.

$7,775,000, excluding bonds assumed, amounting to $78,000.

J 13. Amount of bonds issued. $7,778,000 (including $78,000 bonds assumed).

J 14. Amount of bonds paid. $3,512,000.

J 15. Amount of bonds outstanding. $4,266,000.

J 16. Bonds issued.

Year of Issue.	*When Due.*	*Face Value.*	*Amount Received.* *Par Value.*	*Premium.*	*Rate of Interest, Per Cent.*
1854.	Jan. 1, 1879..	$500	$85,000	........*	..
		1,000	315,000	........*	7
1856.	May 1, 1881..	500	50,000	........*	..
		1,000	50,000	........*	7
1858.	July 1, 1878..	500	25,000	........*	6
1859.	July 1, 1879..	500	25,000	........*	6
1869.	Oct. 1, 1880..	1,000	75,000	........*	7
1869.	Jan. 1, 1884..	1,000	300,000†	........*	7
1872.	May 1, 1892..	1,000	400,000	........*	7
1873.	May 1, 1893..	1,000	200,000	........*	7
1875.	Sept. 1, 1895..	1,000	50,000	........*	6
1875.	Sept. 1, 1895..	1,000	150,000	........*	6
1877.	Sept. 1, 1895..	1,000	25,000	........*	6
1882.	Sept. 1, 1902..	1,000	100,000	$62 50	3.65
1883.	Jan. 1, 1903..	1,000	100,000	1,120 00	4
1883.	Sept. 1, 1897..	1,000	500,000	....	6
1885.	March 1, 1900.	1,000	275,000	....	6
1892.	April 1, 1902..	1,000	400,000	$23,283 44	4.5
1893.	April 1, 1903..	1,000	200,000	4,625 00	4
1895.	Oct. 1, 1905..	1,000	200,000	....	4
1896.	Oct. 1, 1926..	1,000	600,000	58,208 00	4
1897.	April 1, 1917..	1,000	500,000	....	4
1900.	March 1, 1910.	1,000	275,000	18,850 00	4
1900.	April 1, 1920..	1,000	300,000	36,516 00	4
1901.	Oct. 1, 1926..	1,000	600,000	78,594 00	4
1902.	April 1, 1922..	1,000	400,000	41,093 20	4
1902.	Sept. 1, 1922..	1,000	100,000	4,025 00	4
1903.	Jan. 1, 1918..	1,000	100,000	4,317 00	4
1903.	April 1, 1913..	1,000	200,000	1,750 00	4
1903.	June 1, 1922..	1,000	300,000	....	4
1903.	Sept. 1, 1924..	1,000	50,000	....	4
1904.	March 1, 1919.	1,000	175,000	2,625 00	4
1904.	April 1, 1925..	1,000	150,000	5,767 75	4
1905.	March 1, 1919.	1,000	250,000	981 00	4
1905.	Oct. 1, 1920..	1,000	200,000	4,800 00	4
1893.	———, 1903..	....	12,000‡	....	6
1897.	April 1, 1917..	500	20,000‡	....	4.5
1899.	Oct. 1, 1919...	500	21,000‡	....	5
	Oct. 1, 1924...	....	25,000‡	....	5
			$7,803,000		

Deduct bonds dated year 1877 which were never negotiated, but were cancelled...........	25,000
	$7,778,000
Total bonds issued and assumed:	
Issued	$7,700,000
Assumed	78,000
	$7,778,000

---

* No available records.

† Bonds issued in 1869 and due January 1, 1884, for $300,000 were cancelled by the sinking fund commissioners, and returned to the city auditor on March 19, 1881, in compliance with a resolution passed by the city council on March 14, 1881.

‡ These amounts represent the par value of Brooklyn, Glenville and South Brooklyn bonds, assumed by the water works department as part consideration for the transfer to, and acquisition by the department of certain property formerly held by these towns.

Security. The city bonds issued were secured on the "faith and credit of the city."

How to be paid. The form of bond used does not provide for the manner in which the bonds are to be paid.

J 17. Explain how each issue of bonds was disposed of, whether private sale, public auction, bond dividend, etc.

By advertisement, sealed bids being received in answer thereto, and the bonds awarded to the best bidder. Information under this head relating to the issues of the early years is not available. The following extract from the laws of Ohio, 1902 session, Senate Bill number 1, section 95, regulates the method to be adopted:

"Whenever any municipal corporation issues its bonds, it shall offer them at par and accrued interest to the trustees or commissioners in their official capacity of the sinking fund * * *, and only after their refusal to take all or any of such bonds at par and interest bona fide for and to be held for the benefit of such corporation, sinking fund or debt, shall such bonds or as many of them as remain be advertised for public sale. In no case shall the bonds of the corporation be sold for less than their par value, nor shall such bonds when so held for the benefit of such sinking fund or debt be sold, except to meet the requirements of such fund or debt. All sales of bonds, other than to the sinking fund, by any municipal corporation shall be to the highest and best bidder, after thirty days' notice in at least two newspapers of general circulation in the county where such municipal corporation is situated, setting forth the nature, amount, rate of interest and length of time the bonds have to run, with time and place of sale * * *, provided, however, when any such bonds have been once so advertised and offered for public sale, and the same or any part thereof remain unsold, then said bonds or as many as remain unsold may be sold at a private sale, at not less than their par value, under the direction of the mayor, officers and agents of the corporation. * * * "

J 18. State amount and character of other funded debts, if any.

J 19. If funds have been secured from any other sources for the construction and extension of plant, give amounts, dates and sources fully. None.

J 20. What provisions have been made for payment of liabilities when due? None.

J 21. What provisions have been made for payment of interest on bonds?

No specific provisions have been made. The surplus revenue is depended upon to meet all payments of interest. By an ordinance passed December 18, 1883, provision is required for the payment of maturing interest and principal of the water works debt of the city by creating a water works sinking fund. Such a fund, however, is not in existence.

SYRACUSE. Bonds, J 11 to J 21.

J 11. Amount of bonds authorized by charter or statute.

The corporation counsel states that the "city's limitation of indebtedness is fixed by the constitution of the state, not to exceed ten per cent. of the assessed valuation of its real estate."

The following authorizations apply to the bonds issued by the water department:

(1) By laws of New York 1889, chapter 291, section 20	$3,000,000
(2) By the 1894 act, chapter 184, foregoing limitation was increased to $3,500,000, being authority for an additional	500,000
(3) By the 1895 act, chapter 702, authority was given for a further increase of $500,000, in the foregoing limitations	500,000
(4) By city ordinance dated November 12, 1900, as provided by section 26, of the White charter.....	100,000
Total bonds authorized and issued..........	$4,100,000

J 12. Amount of bonds authorized by municipality or vote of company.

$4,100,000. An ordinance of the city dated November 12, 1900, authorized an issue of $100,000 in bonds. All prior issues, amounting to $4,000,000, were authorized by acts of the legislature (see answers to previous questions).

J 13. Amount of bonds issued.

$4,100,000.

J 14. Amount of bonds paid.

$20,000.

J 15. Amount of bonds outstanding.

$4,080,000.

J 16. Bonds issued:

Date of Issue.	*When Due.*	*Amount Received (Includes Premium).*	*Rate of Interest, Per Cent.*	*Security.*
July 1, 1890	July 1, 1920	$500,937.50	3	Credit of the city.
July 1, 1891	July 1, 1920	500,000.00	3	Credit of the city.
Mar. 1, 1892	July 1, 1920	506,276.00	3.5	Credit of the city.
Oct. 1, 1892	July 1, 1920	510,798.50	3.5	Credit of the city.
Mar. 1, 1893	July 1, 1920	524,597.00	3.5	Credit of the city.
Mar. 1, 1894	July 1, 1920	527,225.00	4	Credit of the city.
July 1, 1894	July 1, 1920	502,050.00	3.5	Credit of the city.
Oct. 1, 1895	July 1, 1920	307,530.00	3.5	Credit of the city.
May 1, 1897	Jan. 1, 1927	102,260.00	3.5	Credit of the city.
Apr. 1, 1898	Jan. 1, 1928	104,780.00	3.5	Credit of the city.
Apr. 1, 1901	Apr. 1, 1902 to 1921, $5,000 per annum.	103,745.00	3.5	Credit of the city.

J 17. Explain how each issue of bonds was disposed of, whether private sale, public auction, bond dividend, etc.

The sale of bonds was duly advertised in accordance with law, sealed proposals being received and bonds awarded to the best bidder.

J 18. State amount and character of other funded debts, if any. None.

J 19. If funds have been secured from any other sources for the construction and extension of plant, give amounts, dates and sources fully.

No funds have been secured from other sources specifically for construction and extension of the plant. Under the water act, Section 22 (see the following extract), the city paid certain amounts to the water bureau for water supplied. These payments, which were discontinued in 1901, are as follows:

Year ending June 30	*Amount*
1893	$76,000
1894	26,000
1895	26,000
1896	40,000
1897	60,000
1898	35,000*
1899	90,000**
1900	----
1901	25,000
	$378,000

On January 1, 1900, owing to the water bureau not being able to meet the interest then due on its bonds, the city obtained a temporary loan for $42,000 for that purpose, which was met thereafter by direct taxation. This however, was partially offset by an amount of $36,224.79 of water works funds taken by the city in the year 1902 for the purpose of reducing the general tax budget of that year.

The extract of the "water act" referred to is as follows:

Laws of New York 1889, chapter 291, section 22: "The Syracuse water board shall from time to time fix and determine the water rates to be paid by all consumers of water, including a just annual rate to be paid by the city at large on account of the use of water for municipal purposes. * * * *"

J 20. What provisions have been made for payment of liabilities when due? None.

J 21. What provisions have been made for payment of interest on bonds?

The surplus revenue is depended upon to provide for the payment of interest on bonds.

---

* Fiscal year 1897, $15,000; fiscal year 1898, $20,000.

** Fiscal year 1898, $30,000; fiscal year 1899, $60,000.

NEW HAVEN. Bonds. J 11 to J 21.

J 11. Amount of bonds authorized by charter or statute.

Equal to half the stock issued by the company.

J 12. Amount of bonds authorized by municipality or vote of company. None.

J 13. Amount of bonds issued. None.

While there are not any bonds issued or outstanding, there are $500,000 convertible debentures issued and outstanding. The face value of these debentures is $50, $100, $500 and $1,000 each. They are issued to stockholders. The company agreed to convert them into stock at par on July 1, 1915, or at any interest period after 1910, at the option of the directors. The interest rate is 4 per cent. per annum, payable January 1 and July 1 in each year. There is not any mortgage or covering deed. The debenture is simply a promise by the company to convert into stock and pay interest thereon at 4 per cent. until it has been converted.

J 14, J 15 and J 16 do not apply.

J 17. Explain how each issue of debentures was disposed of, whether private sale, public auction, bond dividend, etc.

Debentures were issued at par to stockholders in the ratio of one debenture per every ten shares held.

J 18. State amount and character of other funded debts, if any.

None.

J 19 and J 20. ———

J 21. What provisions have been made for payment of interest on bonds?

There is no provision made. Any interest charges come out of earnings and are preferential to the dividend on stock.

We were not permitted to examine the accounts and prepare a balance sheet and profit and loss account. Therefore, there are no further answers on New Haven, namely, schedules K, Assets; L, Liabilities; M, Receipts; N, Expenses; O, Profit and Loss.

CHICAGO.

K—Assets.

K 1.	As of date (end of last fiscal year).	December 31, 1905.
K 2.	Cash on hand	$1,191,006.92
K 3.	Notes receivable	
K 4.	Sundry accounts due	1,293,187.95
K 5.	Investments	
K 6.	Patent rights	
K 7.	Office furniture, equipment, including maps, plats and engineering records	88,264.87
K 8.	Land: (a) Now used for water purposes (b) Not now used for water purposes	3,307,618.00
K 9.	Construction at source of supply (cribs)	615,492.04
K 10.	Wells	6,000.00

K 11.	Conduits and aqueducts to mains	$1,820,108.28
K 12.	Buildings	710,104.75
K 13.	Pumping equipment	1,421,851.76
K 14.	Standpipes and tanks	11,909.00
K 15.	Filters and filtration beds	....
K 16.	Mains (including valves and basins)	16,731,222.27
K 16a.	Hydrants (including fire cisterns)	761,672.00
K 17.	Meters	9,655.00
K 18.	Other permanent works, etc.	55,315.00
K 19.	Supplies and equipment not included in above (including teams and tools)	317,477.07
K 20.	Sinking fund (per contra)	300,094.17
K 21.	Other current assets	20,120.00
K 22.	Other capital assets	....
K 23.	Total	$31,739,171.83

K 24. Do the values above given represent the original cost of the present assets, their present market value, or cost of duplication?

The values of the land at pumping stations, storage yards and repair shops were taken from the inventories for January 1, 1906, in the offices of the respective departments. The values of sundry lands not included in above were taken from the comptroller's report for 1904. These latter values have been stated at the same figures in successive comptroller's reports for many years past, with no changes for appreciation or depreciation. The appraisal of the physical value of structural features of the plant is based on the cost of duplication at December 31, 1905, at current prices for material and labor, with due regard to the state of the art and with deductions for depreciation as stated by Mr. D. H. Maury, engineer. Supplies on hand are included at approximate cost. Accounts receivable are shown at their realizable value. The sinking fund of the city (including the fund for water loan) is carried in the "trust funds" balance sheet of the city, which does not ear mark the assets available for the redemption of each city loan. The amount shown above in answer to question 20 is stated, therefore, at $300,094.17, the amount of the sinking fund as per answer to question L 12.

K 25. If none of these, state how values were fixed.

L—Liabilities.

L 1. As of date (end of last fiscal year), December 31, 1905.

L 2.	Capital stock	....
L 3.	Bonds	$1,510,000.00
L 4.	Water pipe extension certificates	588,494.22
L 5.	Unpaid bills	572,645.84
L 6.	Deposits by customers	....
L 7.	Unpaid dividends	....
L 8.	Interest due, but not paid	....
L 9.	Interest accrued, but not due	....

L 10.	Reserve fund		....
L 11.	Depreciation fund		....
L 12.	Sinking fund		$360,094.17
L 13	Other liabilities:		
	Assessment of water rates levied in advance	$802,974.46	
	Judgments and claims pending	183,657.87	
			986,632.33
L 13a.	Surplus		26,909,304.52
L 14.	Total		$32,739,171.25

NOTE. The value of intercepting sewer plant is not included in the assets, this part of the system not having been appraised by the engineer. There is also a liability on account of "special deposits" which cannot be accurately determined, as these are not shown on the books of the department, but are carried with other items under the heading "trust funds" on the books of the comptroller. The amount of this liability at December 31, 1905, we are informed amounts to approximately $35,000.00, which, of course, is offset by a corresponding amount included under the heading "trust funds in the hands of city treasurer," as per the "trust funds" balance sheet of the city, prepared in the comptroller's department.

M—Receipts.

(Before dealing with additional items detailed in answer to questions 28 and 31 of section "I.")

M 1.	For year ending December 31, 1905.	
M 2.	Private consumers metered rates:	
	(a) Domestic (b) Manufacturing and commercial	$1,705,355.69
M 3.	Private consumers unmetered rates:	
	(a) Domestic (b) Manufacturing and commercial	2,393,497.48
M 4.	Rents and sales of meters	......
M 5.	Public hydrants	......
M 6.	Public fountains	......
M 7.	Public buildings	......
M 8.	Street watering	......
M 9.	Penalties on delinquent bills	......
M 10.	Net profit on merchandise account	......
M 11.	Other receipts	15,488.55
M 12.	Total	$4,114,341.72

N—Expenses.

(Before dealing with additional items detailed in answer to question 43 of section "I.")

N 1. For year ending December 31, 1905.

Cost at pumping stations or before water enters distribution system in city.

Pumpage (after allowing for slip and excluding repumpage), 135,888,942,536 gallons.

N 2.	Wages and salaries		$350,559.13
N 3.	Fuel		296,357.80
N 4.	Lubricants		8,137.84
N 5.	Supplies and tools		24,177.63
N 6.	Maintenance, repairs and renewals:		
	(a) Construction at source of supply	$4,115.53	
	(b) Conduits and aqueducts	634.80	
	(c) Buildings	64,102.20	
	(d) Machinery	89,939.18	
			158,791.71
N 7.	Other expenses (including tug service, $19,105.02)		59,027.02
N 8.	Total		$895,581.34
	Gravity supply:		
N 9.	Maintenance, repairs and renewals:		
	(a) Construction at source of supply		
	(b) Conduits and aqueducts		
N 10.	Other expenses		
N 11.	Total		
	Filtration (interception of sewers):		
N 12.	Wages and salaries		$20,531.06
N 13.	Fuel		5,679.78
N 14.	Supplies and tools		238.91
N 15.	Maintenance, repairs, renewals		7,206.83
N 16.	Other expenses		879.98
N 17.	Total		$35,013.26
	Distribution:		
N 18.	Wages and salaries		$96,410.77
N 19.	Supplies and tools		3,450.05
N 20.	Stable expenses		1,251.16
N 21.	Maintenance, repairs and renewals:		
	(a) Distributing reservoirs, standpipes and tanks		
	(b) Mains and hydrants, including hydrant rentals and services, $422,963.99, less revenue for work done and material supplied, $17,413.54	$405,533.45	
	(c) Meters, $17,696.93, less revenue for work done and material supplied, $16,018.02	1,678.91	
			407,212.36

N 22.	Other expenses	$2,770.83
N 22a.	Loss on permit division	22,672.45
N 23.	Total	$557,496.62
	General:	
N 24.	Directors' allowances	......
N 25.	Salaries of officers	14,932.50
N 26.	General office salaries	123,030.59
N 27.	Rent of offices	13,092.45
N 28.	Office expenses	28,794.24
N 29.	Legal expenses	42,899.92
N 30.	Injuries, damages and claims (damages for injuries are included under "wages" headings)	386.00
N 31.	Licenses and royalties	......
N 32.	Insurance—fire, boiler, accident	......
N 33.	Bad debts and allowances (estimated)	50,000.00
N 34.	Net loss on sales of meters, engines and other appliances	......
N 35.	New business:	
	(a) Advertising and soliciting	......
	(b) Appliances and fittings	......
N 36.	Other general expenses	7,133.96
N 37.	Total general expenses	$280,269.66
N 38.	Total expenses	$1,768,361.20

Resume:	
Total receipts	$4,114,341.72
Total expenses	1,768,361.20
Balance to profit and loss	$2,345,980.52

O—Profit and Loss.

(Before dealing with additional items detailed in answer to questions 28, 31 and 43 of section "I.")

O 1. For year ending December 31, 1905.

CREDIT.

O 2.	By balance from last year as adjusted	$34,043,037.68
O 3.	By balance of receipts as above	2,345,980.52
O 4.	By interest on loans or deposits	....
O 5.	By income from sinking fund	....
O 6.	By rent of "Rookery"	35,000.04
O 7.	By balance	....
O 8.	Total	$36,424,018.24

DEBIT.

O 9.	To balance from last year	....
O 10.	To interest on bonds and certificates	$166,359.93
O 11.	To interest on notes, loans and deposits	....
O 12.	To taxes	....
O 13.	To compensation for franchises	....
O 14.	To dividends on stock	....
O 15.	To depreciation fund	....
O 16.	To sinking fund	....
O 17.	To reserve fund	....
O 18.	To other funds	....
O 19.	To extensions and new construction	....
O 20.	To other purposes (operation of bath houses and expenses of high pressure water system commission)	10,620.67
O 21.	To balance	36,247,041.89
O 22.	Total	$36,424,018.24

Surplus December 31, 1904, per books	$34,251,479.30
Deduct miscellaneous adjustments of book entries per "Reconciliation of the surplus account as per the books with the surplus account as per the commission's schedule section O, question 2"	208,441.62
	$34,043,037.68

The above balance of $34,043,037.68 is subject to adjustment in order to reduce the book value of the plant at December 31, 1904, to its actual value, based on the appraisal as at December 31, 1905. (See answer to question O 21.)

Surplus December 31, 1905, per books	$36,423,646.61
Deduct miscellaneous adjustments of book entries as per "Reconciliation of the surplus account as per the books with the surplus account as per the commission's schedule, section L, question 13a, and section O, question 21"	176,604.72
Balance as above	$36,247,041.89
Less amount necessary to be written off the book value of the plant to reduce same to appraised value at December 31, 1905	8,257,737.37
Adjusted surplus December 31, 1905, as per section L, question 13a	*$27,989,304.52

---

* This figure is subject to increase to the extent of the value of the intercepting sewer plant.

Reconciliation of the Surplus Account as per the Books, With the Surplus Account as per the Commission's Schedule, Section "O," Question 2.

As at December 31, 1904.

(*Chicago.*)

		Deduct from Surplus.	*Add to Surplus.*
Amount of duplicate and over payments written off during 1905, but applicable to prior years		....	$4,314.83
Accounts receivable for assessed rates, meter rates and meter mechanical department accounts, uncollected at Dec. 31, 1904, not carried on the balance sheet of the department.......	$852,461.46		
Less one-third of the net assessment for water rates levied in May, 1904, applicable to year ending Dec. 31, 1905...........	778,460.83		
		....	74,000.63
Amounts debited to operating account during the year ending Dec. 31, 1905, applicable to prior periods.............................		$51,602.19	....
Estimated inventory value of stock on hand at Dec. 31, 1904, not shown on the books.......		....	62,674.32
Reserve for doubtful accounts:			
Accounts receivable for assessed rates	$38,764.85		
Accounts receivable for meter rates	19,775.70		
		58,540.55	....
Amount credited to surplus account which properly should be credited to construction account, being a claim for an unfulfilled contract		379,526.10	....
Amount charged on the books to surplus account on account of judgments properly chargeable to construction account.........		....	140,237.44
		$489.668.84	$281.227.22

SUMMARY.

Surplus as per the books, Dec. 31, 1904.................	$34,251,479.30
Add credit adjustments, as above......................	281,227.22
	$34,532,706.52
Deduct debit adjustments, as above....................	489,668.84
Surplus, as adjusted Dec. 31, 1904, as per Commission's Schedule, Section "O," Question 2 (subject to adjustment referred to therein).....................	$34,043,037.68

Reconciliation of the Profit as per the Books, With the Profit as Shown by the Commissioner's Schedule, Section "O"

For the Year Ending December 31, 1905.

(Chicago.)

		Deduct from Profit.	*Add to Profit.*
Amount of assessed rates, meter rates and meter mechanical earnings for current period not set up on the books	$4,094,837.84		
Less collections of assessed and metered rates and meter mechanical earnings credited to revenue account on the books	4,050,705.60		
		....	$44,132.24
Amounts charged against expense account on account of over payments, etc., of rates refunded, and properly chargeable against collection accounts		....	8,800.50
Liabilities at December 31, 1905, not shown on the books		$31,763.59	....
Amounts debited to operating account during current period applicable to prior periods		....	51,692.16
Inventory value of stock of materials, etc., on hand, not shown on the books:			
Dec. 31, 1904 (estimated)	$62,674.52		
Dec. 31, 1905 (as valued)	62,674.52		
		....	....
Reserve for doubtful accounts due		50,000.00	....
Improvements charged to expense account during the year applicable to construction account		....	85,985.46
Amounts charged to construction account during the year, applicable to expense account		27,194.20	....
Cost of laying main charged to property owners and miscellaneous items credited to revenue account which should properly have been credited to construction account		49,246.07	....
Amount of boiler insurance charged during the current period, applicable to a subsequent period		....	320.00
		$158,203.92	$190,610.82

SUMMARY.

Profit for the year as per the books after dealing with interest	$2,372,197.31
Add credit adjustments, as above	190,610.82
	$2,562,808.13
Less debit adjustments, as above	158,203.92
Profit for year, after charging interest on bonds and certificates, less miscellaneous interest earned $121,349.61, as per the Commissioner's Schedule, Section "O"	$2,404,604.21

Reconciliation of the Surplus Account as per the Books With the Surplus Account as per the Commission's Schedule, Section "L," Question 13a, and Section "O," Question 21.

As at December 31, 1905.

(Chicago.)

	Deduct from Surplus.	*Add to Surplus.*
Balance of assessed and metered rates and meter mechanical department accounts receivable, not carried on the books at Dec. 31, 1905	....	$118.132.87
Amount of duplicate and over payments written off	....	4.314.83
Amounts charged against expense account on account of over payments, etc., of water rates, refunded, properly chargeable against collection accounts	....	8.300.93
Liabilities at Dec. 31, 1905, not shown on the books	$31,769.59	....
Inventory value of stock on hand at Dec. 31, 1905, not shown on the books	....	62.674.32
Improvements charged to expense account on the books, properly chargeable to construction account	....	85.985.46
Amounts charged to construction account on the books, properly chargeable to expense account	27.194.30	....
Cost of laying main charged to property owners and miscellaneous items credited to revenue which should properly be credited to construction account	49.340.03	....
Amount charged on the books to surplus account on account of judgments properly chargeable to construction account	....	140.237.44
Amount credited to surplus account which properly should be credited to construction account, being claim on contractors for unfulfilled contract	379.526.10	....
Amount of boiler insurance charged against current period, applicable to subsequent period	......	120.00
Reserve for doubtful accounts receivable	108.540.55	....
	$596,370.57	$419.765.85

SUMMARY.

Surplus as per the books, Dec. 31, 1905	$36.423.646.61
Add credit adjustments, as above	419.765.85
	$36.843,412.46
Deduct debit adjustments, as above	596.370.57
Surplus Dec. 31, 1905, as per the Commission's Schedule, Section "O"	$36.247,041.89
From which deduct amount necessary to be written off the book value of the plant to reduce same to the appraised value, at Dec. 31, 1905	9.337.737.37
Surplus Dec. 31, 1905, as adjusted and as per the Commission's Schedule, Section "L," question 13a, and Section "O," question 21	*$26.909.304.52

---

* This figure is subject to increase to the extent of the value of the intercepting sewer plant.

Profit and Loss Account as per the Commission's Schedule, Schedules "M," "N" and "O," Including Entries Detailed in Answer to Questions 28, 31, 43 of Schedule "L," Year Ended December 31, 1902.

(Chicago.)

Revenue:		Amount		Pumped.
Private consumers, metered rates		$1,700,293.60		12.58
Private consumers, unmetered rates		2,390,497.48		17.65
Public hydrants		415,980.00		3.07
Public fountains and parks		55,000.00		.41
Public buildings, religious and charitable institutions		133,104.30		.98
Street watering		25,000.00		.18
Other receipts from sales of water		86,048.00		.64
Other receipts		15,158.05		.11
Total revenue		$4,820,923.43		35.62
Expenses:				
Cost at pumping stations, or before water enters distribution system in city:				
Wages and salaries		$350,800.29		2.59
Fuel		285,287.80		2.11
Lubricants		8,187.81		.06
Supplies and tools		22,177.09		.16
Maintenance, repairs and renewals:				
(a) Construction at source of supply	$4,115.50		.03	
(b) Conduits and aqueducts	654.50		.01	
(c) Buildings	64,102.20		.47	
(d) Machinery	89,929.18		.66	
		158,791.73		1.17
Other expenses (including tug service $10,105.02)		39,167.09		.29
Total cost at pumping stations		$863,401.21		6.38
Filtration (Intercepting of sewage):				
Wages and salaries	$20,221.06		.15	
Fuel	5,079.78		.04	
Supplies and tools	758.01		.01	
Maintenance, repairs and renewals	7,586.85		.06	
Other expenses	870.16		.01	
Total filtration		35,015.86		.27
Distribution:				
Wages and salaries	$98,410.77		.72	
Supplies and tools	2,670.00		.02	
Stable expenses	5,251.16		.04	
Maintenance, repairs and renewals:				
(a) Mains and hydrants (including hydrant rentals and services)	$422,665.99			
Less revenue for work done and material supplied	17,412.54			
		$405,253.45	2.99	

			Amount.	*Per Million Gals. Pumped.**	
(b) Meters	$37,696.93				
Less revenue for work done and material supplied.	16,018.02				
		21,678.91		.16	
Other expenses		3,430.83		.02	
Loss on permit division		22,672.45		.16	
Total distribution			$558,156.62		4.11
General:					
Salaries of officers		$14,932.50		.11	
General office salaries		123,030.59		.90	
Rent of offices		13,092.45		.10	
Office expenses		28,794.24		.21	
Legal expenses		42,899.92		.31	
Injuries, damages and claims (damages for injuries are included under "wages" headings)		386.00		..	
Insurance; fire, boiler, accident		60,285.00		.45	
Bad debts		50,000.00		.37	
Other general expenses		7,133.96		.06	
Total general			340,554.66		2.51
Cost of operation before dealing with interest and the following additional expenses			$1,834,206.20		13.53
Add additional expenses:					
Taxes		$418,705.00		3.09	
Depreciation		775,848.00		5.72	
			1,194,553.00		8.81
Total cost of operations			$3,028,759.20		22.34
Profit from operations before dealing with interest and extraordinary expenses			$1,801,570.45		13.28
From which deduct:					
Interest on bonds and certificates		$166,349.68		1.22	
Less miscellaneous interest earned		56,918.04		.42	
		$109,431.64		.80	
Extraordinary expenses		10,626.67		.08	
			120,058.31		.88
Balance, being surplus for year			$1,681,512.14		12.40

---

* Pumpage 135,588,942,536 gallons.

CLEVELAND.

K—Assets.

K	1.	As of date (end of last fiscal year) December 31, 1906.		
K	2.	Cash on hand		$457,233.71
K	3.	Notes receivable		....
K	4.	Sundry accounts due		169,730.42
K	4a.	Accounts receivable city of Cleveland	$36,781.87	
		Less amount due city for value of lot at corner of Pearl and Columbus sts.	7,500.00	
				29,281.87
K	5.	Investments		....
K	6.	Patent rights		....
K	7.	Office furniture, including maps, field books, drawings, tracings, prints, specifications and other engineering records		86,879.15
K	8.	Land:		
		(a) Now used for water purposes	$279,700.00	
		(b) Not now used for water purposes	....	
				279,700.00
K	9.	Construction at source of supply (cribs)		154,103.71
K	10.	Wells		....
K	11.	Conduits, sand vitrified pipes and aqueducts to mains		1,365,861.27
K	12.	Buildings		714,533.21
K	13.	Pumping equipment		825,455.77
K	14.	Distributing reservoirs		370,000.00
K	15.	Filters and filtration beds		....
K	16.	Mains (including valves)		5,815,628.01
K	16a.	Hydrants		181,055.75
K	17.	Meters		682,193.13
K	18.	Other permanent works and accessories		55,262.01
K	19.	Supplies and equipment not included in above		167,305.41
K	20.	Sinking fund		....
K	21.	Other current assets		....
K	22.	Other capital assets		....
K	23.	Total		$11,096,870.75

Of the total amount of accounts receivable at December 31, 1906, the amount due for work done and material supplied was $30,076.31, representing accounts against other city departments and sundry persons from 1896 to December 31, 1905. As it is highly improbable that the whole of the $30,076.31 can be collected, we have written off the sum of $19,858.31 against the year 1905 and prior periods.

K 24. Do the values above given represent the original cost of the present assets, their present market value or cost of duplication?

The appraisal of lands is based upon the estimated value on December 31, 1905. The appraisal of the physical value of structural features of the plant is based on the cost of duplication on December 31, 1905, at current prices for material and labor with due regard to the state of the art and with deductions for depreciation. Supplies on hand are shown at approximate cost. Accounts receivable are shown at realizable value.

K 25. If none of these, state how values were fixed. ———

L—Liabilities.

L 1. As of date (end of fiscal year) December 31, 1905.

L 2.	Capital stock		....
L 3.	Bonds		$4,266,000.00
L 4.	Notes payable		....
L 5.	Unpaid bills		26,030.88
L 6.	Deposits by customers:		
	(a) For pipe laying	$28,095.93	
	(b) For meter rates	326,512.67	
	(c) Permits	45.00	
			354,653.60
L 7.	Unpaid dividends		....
L 8.	Interest due but not paid		....
L 9.	Interest accrued but not due		42,633.33
L 10.	Reserve fund		....
L 11.	Depreciation fund		....
L 12.	Levy of assessed rates in advance		43,440.87
L 13.	Other liabilities (meter department refunds payable and reserve for claims pending)		12,674.15
L 13a.	Surplus		6,941,137.92
L 14.	Total		$11,686,570.75

There is a small liability for pipe taken over from South Brooklyn, the amount of which was not known at the date of our examination.

M—Receipts.

(Before dealing with additional items detailed in answer to questions 28 and 31 of section "I.")

M 1. For year ended December 31, 1905.

M 2.	Private consumers, metered rates:	
	(a) Domestic (b) Manufacturing and commercial	$640,118.84
M 3.	Private consumers, unmetered rates	232,231.16
M 4.	Rents and sales of meters	......
M 5.	Public hydrants	......

M	6.	Public fountains	......
M	7.	Public buildings	......
M	8.	Street watering	$1,700.00
M	9.	Penalties on delinquent bills	......
M	10.	Net profit on merchandise account	......
M	11.	Other receipts	1,772.77
M	12.	Total	$875,921.77

Metered rates are payable half yearly, on April 1 and October 1, for the preceding six months, and in this case an "earnings account" and a "collection account" are carried, thus ensuring in the financial books a record of the earnings, the collections, and the amount due and unpaid at any date. Assessed rentals are levied and payable half yearly on April 1 and October 1, in advance, the earnings account only being credited when the payments are received. Assessed rentals unpaid at the end of any fiscal year are not shown on the financial books as "accounts receivable" at the closing date, and any allowances made on the individual assessments do not appear on the financial books. These allowances, other than refunds actually paid in cash, are merely recorded on the collection books.

N—Expenses

(Before dealing with additional items detailed in answer to question 43 of section "I.")

N 1. For year ending December 31, 1905.

Cost at pumping station or before water enters distribution system in city.

Pumpage (after deducting slip, and excluding repumpage from low service into high service system, 21,040,197,369 gallons.)

N	2.	Wages and salaries		$52,605.34
N	3.	Fuel		41,889.34
N	4.	Lubricants		2,122.85
N	5.	Supplies and tools		1,168.91
N	6.	Maintenance, repairs and renewals:		
		(a) Construction at source of supply	$152.78	
		(b) Conduits and aqueducts	......	
		(c) Buildings	1,385.84	
		(d) Machinery	7,709.58	
				9,257.20
N	7.	Other expenses		5,909.00
N	8.	Total		$115,091.53

N 9, N 10, N 11. Gravity supply ......

N 12—N 17, inclusive. Filtration ......

	Distribution:		
N 18.	Wages and salaries		$38,604.42
N 19.	Supplies and tools		239.31
N 20.	Stable expenses		......
N 21.	Maintenance, repairs and renewals:		
	(a) Distributing reservoirs, standpipes and tanks	$902.23	
	(b) Mains and hydrants, *$79,077.18, less revenue for labor and material used in repairs for outside parties, $6,202.74	72,874.44	
	(c) Meters	32,129.15	
	(d) Services and stopcocks, $45,568.89, less revenue derived from ferrule and tapping, $17,635.21	27,973.68	
			133,839.50
N 22.	Other expenses		6,107.69
N 23.	Total		$178,790.92
	General:		
N 24.	Directors' allowances		......
N 25.	Salaries of officers		$6,641.66
N 26.	General office salaries		50,848.89
N 27.	Rent of offices		......
N 28.	Office expenses		6,559.60
N 29.	Legal expenses		......
N 30.	Injuries, damages and claims		75.20
N 31.	Licenses and royalties		......
N 32.	Insurance—fire, boiler, accident		......
N 33.	Bad debts		10,690.74
N 34.	Net loss on sale of meters, engines and other appliances		......
N 35.	New business:		
	(a) Advertising and soliciting		......
	(b) Appliances and fittings		......
N 36.	Other general expenses		8,392.49
N 37.	Total general expenses		$83,208.58
N 38.	Total expenses		$375,093.03

Résumé:	
Total receipts	$875,822.77
Total expenses	375,093.03
Balance to profit and loss	$500,729.74

---

* Includes about $40,000 spent for lowering mains and changing grades.

O—Profit and Loss.

(Before dealing with additional items detailed in answer to questions 28, 31 and 42, section "L.")

O 1. For year ended December 31, 1905.

CREDIT.

O 2.	By balance from last year as adjusted	*$8,508,934.79
O 3.	By balance of revenue as above	490,729.74
O 4.	By interest on loans or deposits	30,785.54
O 5.	By income from sinking fund	......
O 6.	By other items	......
O 7.	By balance	......
O 8.	Total	$9,030,450.07

DEBIT.

O 9.	To balance from last year	......
O 10.	To interest on bonds	$168,108.33
O 11.	To interest on notes, loans and deposits	......
O 12.	To taxes	......
O 13.	To compensation for franchises	......
O 14.	To dividends on stock	......
O 15.	To depreciation fund	......
O 16.	To sinking fund	......
O 17.	To reserve fund	......
O 18.	To other funds	......
O 19.	To extensions and new construction	......
O 20.	To other purposes	19,020.76
O 21.	To surplus December 31, 1905	**8,843,320.98
O 22.	Total	$9,030,450.07

NOTE. The city treasurer now allows the department interest on the average daily cash balance held by him and belonging to the department. This practice only commenced in the year 1904.

---

* Surplus December 31, 1904, per books	$8,442,637.74
Add miscellaneous adjustments of book entries per "Reconciliation of the surplus account as per the books with the surplus account as per the commission's schedule "O," question 2"	66,297.05
	$8,508,934.79

The above balance of $8,508,934.79 is subject to adjustment in order to reduce the book value of the plant at December 31, 1904, to its actual value based on the appraisal, as at December 31, 1905. See answer to question "FF" 24.

Reconciliation of the Surplus Account as per the Books, with the Surplus Account as per the Commission's Schedule
Section "O," Question 2.
As at December 31, 1904.
(*Cleveland.*)

	Deduct from Surplus.	*Add to Surplus.*
Amount of cash received to date on October, 1904, levy of assessed water rentals credited to earnings account adjusted in subsequent entries.......	$130,214.43	
One-half of October, 1904, levy of assessed water rentals applicable to the three months to December 31, 1904.		$65,828.66
Assessed water rentals outstanding at December 31, 1905, applicable to levies prior to October 1, 1904, not credited to earnings on the books......		457.95
One-half of April, 1905, levy of meter water rentals applicable to the three months to December 31, 1904......		147,829.60
Allowances and refunds on levies of meter water rentals applicable prior to December 31, 1904, charged in subsequent period	1,947.31	
Meter water rentals credited on the books in a subsequent period applicable to levies prior to April, 1905, levy....		3,589.58

Note relating to previous page:

** Surplus December 31, 1905, per books......	$8,714,645.79
Add miscellaneous adjustments of book entries per "Reconciliation of the surplus account as per the books with the surplus account as per the commission's schedule section "L," question 13a, and section "O," question 21	128,675.19
Balance as above..................	$8,843,320.98
Less amount necessary to be written off the book value of the plant to reduce same to appraised value at December 31, 1905.....	2,827,183.06
	$6,016,137.92
Add amount transferred from bond redemption account (years 1879-1884)..............	925,000.00
Adjusted surplus December 31, 1905, as per section "L," question 13a...............	$6,941,137.92

		Deduct from Surplus.	*Add to Surplus.*
Refunds of meter water rentals charged on the books in a subsequent period applicable to levies prior to April, 1905, levy		$4,408.40	
Reserve for doubtful accounts:			
Accounts receivable for work done	$14,814.57		
Meter water rentals	1,935.05		
Assessed water rentals	84.25		
		16,834.87	
Amount of permit account deposits applicable to period prior to January 1, 1905, and charged to water rent account in error, now adjusted, same having been credited to earnings when received		51.00	
Adjustment of accounts receivable account for work done:			
Amounts credited to earnings in a subsequent period applicable to period prior to December 31, 1904			$5,152.52
Rebates on assessed water rentals applicable to levies prior to October 1, 1904, levy, entered in subsequent period		184.25	
Amount reserved against probable loss of amount of balance of lost money account		1,925.16	
Inventory of supplies and material at December 31, 1904, not entered on the books			32,230.27
Expenses charged in subsequent period applicable to the period prior to December 31, 1904		2,779.08	
Interest received subsequent to December 31, 1904, applicable to a prior period			7,957.97
Interest accrued on bonds at date, not credited on the books as a liability		28,500.00	
		$196,844.80	$263,146.85

SUMMARY.

Surplus as per the books December 31, 1904	$9,440,632.74
Add credit adjustment as above	263,146.85
	$9,703,779.59
Deduct debit adjustment as above	196,844.80
Surplus as adjusted December 31, 1904, as per commissioner's schedule, section "O," question F (subject to adjustment referred to therein)	$9,506,934.79

Reconciliation of the Profit as per the Books, with the Profit as Shown by the Commission's Schedule, Section "O."
For the Year Ended December 31, 1905.
(*Cleveland.*)

		Deduct from Profit.	*Add to Profit.*
Assessed water rentals entered in the current period now written back, adjustment of same being made in a subsequent entry		$208,137.06	
Assessed water rentals, as adjusted, applicable to current period			$229,392.31
Assessed water rentals outstanding on December 31, 1905, not dealt with on the books as an asset			3,715.48
Meter earnings entered in the current period now written back, adjustment of same being made in a subsequent entry		583,642.00	
Meter earnings, as adjusted, applicable to the current period			640,118.84
Amount received for permits issued, erroneously credited to profit and loss account, now corrected		120.00	
Adjustment of accounts receivable account for work done:			
Amount credited to earnings in a subsequent period applicable to the current period			2,202.89
Amount credited to earnings in a current period applicable to the prior period		1,248.44	
Reserve for doubtful accounts:			
Amounts receivable for work done	$5,023.44		
Meter water rentals	5,585.25		
Assessed water rentals	82.05		
		10,690.74	
Inventories of supplies and material on hand, not shown on the books:			
December 31, 1904		32,330.37	
December 31, 1905			33,642.82
Expenses charged in a subsequent period applicable to the current period		7,260.11	
Expenses charged in the current period applicable to a prior period			2,779.08
Old engine sold and amount credited to machinery repairs account in error, now corrected		1,560.00	

	Deduct from Profit.	*Add to Profit.*
Boring in Lake Erie, charged to construction account, now transferred to profit and loss account	$334.35	
Expenses at temporary cribs charged to construction account in error, now corrected	1,754.00	
Adjustment of interest received account:		
Amount credited in the current period, applicable to a prior period	7,857.97	
Amount credited in a subsequent period, applicable to the current period		$10,280.00
Interest accrued on bonds at December 31, 1904, charged during the current period in error		58,500.00
Interest accrued on bonds at December 31, 1905, not carried on the books as a liability at that date	42,633.33	
	$898,268.28	$960,641.42

SUMMARY.

Profit for the year as per the books after dealing with interest	$272,013.05
Add credit adjustments as above	960,641.42
	$1,232,654.47
Deduct debit adjustments as above	898,268.28
Profit for year (after charging $147,322.79 interest on bonds less miscellaneous interest earned) per the commission's schedule section "O"	$334,386.19

Reconciliation of the Surplus Account as per the Books, with the Surplus Account as per the Commission's Schedule, Section "L," Question 13a and Section "O," Question 21. As at December 31, 1905. (Cleveland.)

	Deduct from Surplus.	*Add to Surplus.*
Proportion of levy of meter water rentals made April 1, 1906, applicable to the three months ending December 31, 1905		$179,180.35
Proportion of levy of assessed water rentals made October 1, 1905, applicable		

		Deduct from Surplus.	*Add to Surplus.*
to three months ending March 31, 1906		$43,440.87	
Amount of meter water rentals less rebates and allowances entered in the books subsequent to December 31, 1905, but applicable to October 1, 1905, levy, now corrected			$21,086.21
Assessed water rentals outstanding at December 31, 1905, not dealt with on the books as an asset			4,173.43
Permit deposits erroneously charged to profit and loss account, now corrected		45.00	
Amount of accounts receivable for work done credited to profit and loss account subsequent to December 31, 1905			6,106.97
Reserve for doubtful accounts:			
Accounts receivable for work done	$19,838.31		
Meter water rentals	7,520.30		
Assessed water rentals	167.00		
		27,525.61	
Amount reserved against probable loss of amount of balance of lost money account		1,925.16	
Amount of allowance made to city of Glenville on their water bill charged to earnings account, now capitalized as part of the cost of acquisition of Glenville water system			1,333.75
Inventory of supplies and materials at December 31, 1905, not entered on the books			33,642.82
Expenses at temporary cribs charged to construction account in error, now corrected		1,754.00	
Expense of boring in Lake Erie charged to construction account, now transferred to profit and loss		934.26	
Old engine sold and amount credited to machinery repairs account in error, now corrected		1,560.00	
Expenses charged to profit and loss account subsequent to December 31, 1905, but applicable prior to that date, now corrected		7,260.11	

	Deduct from Surplus.	*Add to Surplus.*
Interest earned on bank deposits to December 31, 1905, and not credited to profit and loss account until a subsequent date, now corrected		$10,250.00
Interest accrued on bonds at December 31, 1905, not carried on the books as a liability at that date	$12,831.23	
	$127,078.34	$255,783.53

SUMMARY.

Surplus as per the books December 31, 1905	$8,714,615.79
Add credit adjustments as above	255,783.53
	$8,970,399.32
Deduct debit adjustments as above	127,078.34
Surplus at December 31, 1905 as per the commission's schedule, section "O," question 21	$8,843,320.98
From which deduct:	
Amount necessary to be written off the book value of the plant to reduce same to the appraised value	2,827,183.06
	$6,016,137.92
To which add:	
Amount transferred from bond redemption account	925,000.00
Surplus December 31, 1905, as adjusted and as per the commission's schedule, section "L," question 13a, and section "O," question 21	$6,941,137.92

Profit and Loss Account.
Per the Commission's Schedule, Sections "M," "N" and "O," Including Entries Detailed in Answers to Questions 28, 31 and 43 of Section "I."
Year Ended December 31, 1905.
(Cleveland.)

				Amount.	*Per Million Gals. Pumped.**	
Revenue.						
Private consumers—metered rates				$640,118.84		30.42
Private consumers—unmetered rates				232,231.16		11.04
Public hydrants				220,000.00		10.46
Public fountains				6,678.00		.32
Public buildings				8,500.00		.40
Street watering				6,500.00		.31
Other receipts from sales of water				27,636.00		1.31
Miscellaneous receipts				1,772.77		.09
Total revenue				$1,143,436.77		54.35
Expenses.						
Cost at pumping station, or before water enters distribution system in city:						
Wages and salaries				$52,605.34		2.50
Fuel				41,609.34		1.97
Lubricants				3,122.84		.15
Supplies and tools				1,168.91		.06
Maintenance, repairs and renewals:						
(a) Construction at source of supply			$2,000.00			.10
(b) Buildings			12,000.00			.57
(c) Machinery			15,000.00			.71
				29,000.00		
Other expenses				5,229.90		.25
Total cost at pumping stations				$132,736.33		6.31
Distribution:						
Wages and salaries			$38,604.42		1.83	
Supplies and tools			239.31		.01	
Maintenance, repairs and renewals:						
(a) Distributing reservoirs, stand-pipes and tanks		$3,000.00			.14	
(b) Mains and hydrants	$76,202.74				3.62	
Less revenue for labor and material used in repairs for outside parties	6,202.74				.29	
		70,000.00				
(c) Meters		40,000.00			1.91	

---

*21,040,197,169 gallons.

				Amount	Per Million Gals Pumped	
(d) Services and stop-cocks	$45,528.89				2.16	
Less revenue derived from "ferrule and tapping"	17,623.21				.84	
		$27,905.68				
			$140,925.68			
Other expenses			6,347.02		.31	
				$181,125.10		8.85
General:						
Directors' allowances			$3,000.00		.14	
Salaries of officers			6,667.00		.32	
General office salaries			55,618.40		2.65	
Rent of offices			5,000.00		.24	
Office expenses			6,520.00		.31	
Legal expenses			2,000.00		.10	
Injuries, damages and claims			75.20		.00	
Insurance; fire, boiler and accident			15,125.06		.72	
Bad debts			10,689.74		.51	
Other general expenses			10,300.49		.49	
Total general				113,772.24		5.41
Total cost of operations before dealing with interest and the following additional expenses				$432,633.07		20.57
Add additional expenses:						
Taxes			$151,311.00		7.19	
Depreciation			333,338.00		15.84	
				484,649.00		23.03
Total cost of operations				$917,282.07		43.60
Profit from operations before dealing with interest				$226,154.10		10.75
Interest on bonds			$166,793.26		7.93	
Less subscriptions interest earned			20,845.54		.99	
			$145,947.72		6.94	
Extraordinary expenses			19,050.76		.90	
				164,998.48		7.84
Balance, being surplus for the year				$61,155.62		2.91

SYRACUSE.

K—Assets.

K 1.	As of date (end of last fiscal year) December 31, 1905.		
K 2.	Cash on hand		$60,775.91
K 3.	Notes receivable		......
K 4.	Sundry accounts due		26,781.03
K 5.	Investments (giving particulars)		......
K 6.	Patent rights		......
K 7.	Office furniture and equipment, including maps, plans, profiles, field books, etc.		52,919.00
K 8.	Land, including sources of supply, right of way for conduit line, etc.:		
	(a) Now used for water purposes	$939,268.66	
	(b) Not now used for water purposes	82,910.00	
			1,022,178.66
K 9.	Construction for storage at source of supply.		100,520.73
K 9a.	Salaries and fees and miscellaneous expenses for construction work		68,625.00
K 10.	Wells		......
K 11.	Conduits and aqueducts to mains		869,807.38
K 12.	Buildings		19,000.00
K 13.	Pumping equipment		......
K 14.	Distributing reservoirs		354,515.04
K 15.	Filters and filtration beds		......
K 16.	Mains, including service pipes		1,913,798.37
K 16a.	Hydrants		66,469.67
K 17.	Meters		1,798.00
K 18.	Other permanent works (teams, tools and other accessories)		3,852.50
K 19.	Supplies and equipment not included in above		20,231.06
K 20.	Sinking fund		......
K 21.	Other current assets		......
K 22.	Other capital assets		......
K 23.	Total		$4,581,272.35

K 24. Do the values above given represent the original cost of the present assets, their present market value, or cost of duplication?

The land is shown at its estimated value on December 31, 1905. The appraisal of the physical value of structural features of the plant is based on the cost of duplication on December 31, 1905, at current prices for material and labor, with due regard to the state of the art and with deductions for depreciation. Supplies are valued at approximate cost. The accounts receivable are shown at their realizable value.

K 25. ———

L—Liabilities.

L. 1. As of date (end of last fiscal year) December 31, 1905.

L. 2.	Capital stock	......
L. 3.	Bonds	$4,080,000.00
L. 4.	Notes payable	......
L. 5.	Unpaid bills	2.85
L. 6.	Deposits by customers	191.00
L. 7.	Unpaid dividends	......
L. 8.	Interest due but not paid	......
L. 9.	Interest accrued but not due	700.00
L. 10.	Reserve fund	......
L. 11.	Depreciation fund	......
L. 12.	Surplus	500,378.50
L. 13.	Other liabilities	......
L. 14.	Total	$4,581,272.35

M—Receipts.

(Before dealing with additional items detailed in answers to questions 28 and 31 of section "I.")

M 1. For year ended December 31, 1905.

M 2.	Private consumers, metered rates:	
	(a) Domestic (b) Manufacturing and commercial	$225,068.00
M 3.	Private consumers, unmetered:	
	(a) Domestic (b) Manufacturing and commercial	41,737.46
M 3a.	Frontage tax	15,639.72
M 4.	Rents and sales of meters	......
M 5.	Public hydrants	......
M 6.	Public fountains	......
M 7.	Public buildings	......
M 8.	Street watering	......
M 9.	Penalties on delinquent bills	......
M 10.	Net profit on merchandise account	......
M 11.	Other receipts	500.00
M 12.	Total	$282,945.18

N—Expenses.

(Before dealing with additional items detailed in answer to question 43 of section "I.")

N 1. For year ended December 31, 1905.

Cost at pumping station or before water enters distribution system in city pumping:

N 2. to N 8. Syracuse having no pumping stations, questions N 2 to N 8, inclusive, do not apply.

Gravity supply:

N 9. Maintenance, repairs and renewals:

(a) Construction at sources of supply . . $123.08

	(b) Conduits and aqueducts	$759.05		
			$885.03	
N 10.	Other expenses		1,659.87	
N 11.	Total			$2,544.90
	Filtration:			
N 12	to N 17, inclusive; Syracuse having no filtration plant, do not apply.			
	Distribution:			
N 18.	Wages and salaries		$21,427.39	
N 19.	Supplies and tools		1,323.59	
N 20.	Stable expenses		3,827.06	
N 21.	Maintenance, repairs and renewals:			
	(a) Distributing reservoirs, standpipes and tanks	$534.08		
	(b) Mains and hydrants	12,804.02		
	(c) Meters	2,661.40		
	(d) Services and stopcocks	7,115.86		
			23,115.36	
N 22.	Other expenses		773.57	
			$50,466.97	
N 22a.	Less revenue for labor and material used in repairs and other work for outside parties		6,055.63	
N 23.	Total			44,411.34
	General:			
N 24.	Directors' allowances		......	
N 25..	Salary of superintendent		$2,600.00	
N 26.	General office salaries		13,310.50	
N 27.	Rent of offices		1,860.00	
N 28.	Office expenses		4,289.40	
N 29.	Legal expenses		......	
N 30.	Injuries, damages and claims		......	
N 31.	Licenses and royalties		......	
N 32.	Insurance—fire		208.00	
N 33.	Bad debts		......	
N 34.	Net loss on sales of meters, engines and other appliances		......	
N 35.	New business:			
	(a) Advertising and soliciting		......	
	(b) Appliances and fittings		......	
N 36.	Other general expenses		141.10	
N 37.	Total general expenses			22,409.00
N 38.	Total expenses			$69,365.24

Résumé:

Total receipts	$282,945.18
Total expenses	69,365.24
Balance	$213,579.94

O—Profit and Loss.

(Before dealing with additional items detailed in answers to "F" 28, 31 and 43.)

O 1. For year ended December 31, 1905.

CREDIT.

O 2.	Balance from last year as adjusted	*$625,945.29
O 3.	Balance of receipts	213,579.94
O 4.	Interest on deposits	2,521.73
O 5.	Income from sinking fund	......
O 6.	Other items (giving particulars, if important)	......
O 7.	Balance (if deficit)	......
O 8.	Total	$842,046.96

DEBIT

O 9.	Balance from last year	......
O 10.	Interest on bonds	$140,343.75
O 11.	Interest on notes, loans and deposits	......
O 12.	Taxes	4,098.77
O 13.	Compensation for franchises	......
O 14.	Dividends on stock	......
O 15.	Depreciation fund	......
O 16.	Sinking fund	......
O 17.	Reserve fund	......
O 18.	Other funds (giving particulars)	......
O 19.	Extensions and new construction	......
O 20.	Other purposes	......
O 21.	Surplus December 31, 1905	**697,604.44
O 22.	Total	$842,046.96

---

* Surplus December 31, 1904, per books	$608,585.53
Add miscellaneous adjustments of book entries per "Reconciliation of the surplus account as per the books, with the surplus account as per the commission's schedule 'O 2'"	17,359.76
	$625,945.29

The above balance of $625,945.29 is subject to adjustment in order to reduce the book value of the plant at December 31, 1904, to its actual value based on the appraisal as at December 31, 1905. (See answer to "O" 21.)

Reconciliation of the Surplus Account as per the Books, with the Surplus Account as per the Commission's Schedule "O" 2.
As at December 31, 1904.

		Deduct from Surplus.	*Add to Surplus.*
Amount due for meter rates for December, 1904, not credited until January 1905			$11,374.37
Value of inventory of stock on hand at December 31, 1904, not entered on books			2,613.05
Amount due for work done and material supplied prior to December 31, 1904, not entered on the books, $1,096.87; less 50 per cent. considered irrecoverable, $548.44..................			548.43
Allowance credited to revenue during year ended December 31, 1905, applicable to prior years, as follows:			
Outside labor and material account	$298.49		
Frontage tax account.....	4,519.95		
			4,818.44
Interest on bonds charged during year ended December 31, 1905, applicable to prior period..................		$743.75	
Amount charged during year ended December 31, 1905, on account of damages, applicable to prior periods....		1,330.78	
Amounts charged in error to expense account prior to December 31, 1904, properly chargeable to loaned property account			80.00
		$2,074.53	$19,434.29

Note relating to previous page:

** Surplus December 31, 1905, as per books...	$640,188.48
Add miscellaneous adjustments of book entries as per "Reconciliation of the surplus account as per the books with the surplus account as per the commission's schedule 'L' 12 and 'O' 21"........................	57,415.96
Balance as above..................	$697,604.44
Less amount necessary to be written off the book value of the plant to reduce same to appraised value at December 31, 1905.......	197,225.94
Adjusted surplus December 31, 1905, as per "L" 12	$500,378.50

SUMMARY.

Surplus as per the books, December 31, 1904	$608,585.53
Add credit adjustments as above	19,434.29
	$628,019.82
Deduct debit adjustments as above	2,074.53
Surplus at December 31, 1904, as per the commission's schedule "O" 2 (subject to adjustment referred to therein)	$625,945.29

Reconciliation of the Profit as per the Books, with the Profit as per the Commission's Schedule Section "O."
Year Ended December 31, 1905.

		Deduct from Profit.	*Add to Profit.*
Meter rates applicable to prior period entered on books in current period		$11,374.37	
Meter rates applicable to current period not entered on books until subsequent period			$12,226.96
Inventory value of stock on hand at December 31, 1904, not shown on the books at that date		2,613.05	
Inventory value of stock on hand at December 31, 1905, not shown on the books at that date			3,180.43
Accounts receivable for the following, not shown on the books at December 31, 1905:			
Meter repairs account	$483.16		
Outside labor and material account	61.08		
Frontage tax account	3,834.31		
			4,378.55
Amounts credited to revenue during current year, applicable to prior periods, as follows:			
Outside labor and material account	$298.49		
Frontage tax account	4,519.95		
		4,818.44	
Amount charged to expense account during current period properly chargeable to loaned property account			28.60
Amounts charged during current year to expense account, properly chargeable to construction account			17,269.39

	Deduct from Profit.	*Add to Profit.*
Amounts paid for damages charged during current year, properly applicable to prior periods..................		$1,330.78
Interest on bonds charged during current year applicable to prior year, $743.75; less amount paid in subsequent period properly chargeable to current year, $700.00.............		43.75
	$18,805.86	$58,862.06

SUMMARY.

Profit as per books after dealing with interest........	$31,602.95
Add credit adjustments as above...................	58,862.06
	$90,465.01
Deduct debit adjustments as above.................	18,805.86
Profit for year (after charging $137,822.02 interest on bonds, less miscellaneous interest earned) per the commission's schedule section "O"..........	$71,659.15

Reconciliation of the Surplus Account as per the Books, with the Surplus Account as per the Commission's Schedule "L" 12, *"O"* 21.
As at December 31, 1905.

		Deduct from Surplus.	*Add to Surplus.*
Accounts receivable for the following, not shown on the books at December 31, 1905:			
Outside labor and material account (1904)	$548.43		
Outside labor and material account (1905)	61.08		
Meter repair account.....	483.16		
Meter rates account......	12,230.96		
Frontage tax account.....	3,934.31		
			$17,257.94
Inventory value of stock on hand at December 31, 1905, not shown on the books at that date...............			3,180.43
Amounts charged during current year to expense account properly chargeable to construction account.......			37,569.59

	Deduct from Surplus.	Add to Surplus.
Amounts charged in error to expense account in current and prior periods properly chargeable to loaned property account		$108.00
Interest on bonds paid in subsequent period properly chargeable to current period	$700.00	
	$700.00	$58,115.96

SUMMARY.

Surplus as per the books December 31, 1905	$640,188.48
Add credit adjustments as above	58,115.96
	$698,304.44
Deduct debit adjustments as above	700.00
Surplus at December 31, 1905, as per the commission's schedule, "O" 21	$697,604.44
From which deduct:	
Amount necessary to be written off the book value of the plant to reduce same to appraised value	197,225.94
Surplus December 31, 1905, as adjusted and as per the commission's schedule, "L" 12 and "O" 21	$500,378.50

Profit and Loss Account per Commission's Schedule Sections M, N and O, Including Entries Detailed in Answers to Questions "I" 28, 31 and 43.

Year Ended December 31, 1905.

Revenue.	Amount.	Per million gallons consumed. (Consumption 4,507,750,000.)
Meter rates	$225,068.06	49.93
Unmetered rates	41,737.46	9.26
Public hydrants	69,725.00	15.47
Public fountains	7,877.00	1.75
Public buildings	897.00	.20
Street watering	4,866.00	1.08
Miscellaneous receipts from sales of water	16,830.00	3.73
Frontage tax	15,639.72	3.47
Other receipts	600.00	.13
Total revenue	$382,335.16	85.01

Expenses.		*Amount.*		*Per million gals. consumed.*
Gravity supply:				
Maintenance, repairs and renewals:				
(a) Construction at source of supply	$125.98			.02
(b) Conduits and aqueducts	759.05			.17
		$885.03		
Other expenses		1,759.87		.39
Total gravity supply		$2,644.90		.58
Distribution:				
Wages and salaries		$20,671.39		4.59
Supplies and tools		1,323.59		.29
Stable expenses		3,477.06		.77
Maintenance, repairs and renewals:				
(a) Distributing reservoirs	$534.08		.12	
(b) Mains and hydrants	12,954.02		2.87	
(c) Meters	2,661.40		.59	
(d) Services and stopcocks	7,115.86		1.58	
		23,265.36		5.16
Other expenses		773.57		.17
		$49,510.97		10.98
Less revenue for labor and material used in repairs and other work for outside parties		6,055.63		1.34
Total distribution		$43,455.34		9.64
General:				
Salaries of officers	$2,600.00			.58
General office salaries	13,310.50			2.96
Rent of offices	1,860.00			.41
Office expenses	4,289.40			.95
Legal expenses	250.00			.06
Insurance (fire and accident)	1,458.00			.32
Other general expenses	141.10			.03
Total general		$23,909.00		5.31
Cost before dealing with additional expenses		$70,009.24		15.53

Expenses		Amount	Per million gals. consumed.	
Add additional expenses:				
Taxes	$60,628.77		13.45	
Depreciation	88,023.00		19.53	
		$148,651.77		32.98
Total cost of operations before dealing with interest		$218,601.01		48.51
Profit from operations before dealing with interest		$164,572.17		36.51
Interest on bonds	$140,343.77		31.15	
Less miscellaneous interest earned	7,286.71		1.62	
		133,057.06		29.53
Balance, being surplus for year		$31,515.11		7.00

GENERAL HISTORY AND LEGISLATION

United States Gas Works

(Schedule I)

By JOHN H. GRAY

Sources: As Schedule I relates primarily to the legal setting of these undertakings, I have attempted in every case to examine the constitutions of each of the states in which the gas works studied are located; also all of the legislation, general and special, affecting the cities concerned; all the charters of the gas companies studied; the ordinances of the cities in which the undertakings are situated; all of the court decisions bearing directly on these undertakings, and many of the decisions bearing on kindred enterprises. Wherever the same could be obtained, I have examined not only the decisions, but also the records of the different cases. The ordinances of the cities have been examined, and also the rules of procedure of councils. In all of these cases the examination has covered the whole life of the undertaking, under whatever form of ownership or management. All contracts in which one of the contracting parties was a public authority have been examined. The records of the city councils have been searched for information. Wherever there have been public investigations of which a record—printed or written—was kept, I have made use of these. In many cases the newspaper files have been used with a view of learning the attitude of the press. I have attempted in each community to interview, not only the city and company officials, but the representatives of opposing views, as voiced by the commercial and reform organizations of the communities.

A—HISTORICAL AND GENERAL.

A 1. Date when this establishment began to sell gas.

Wheeling. January 1, 1851.

Norfolk. Probably 1854. Specifications for retort house dated May 2, 1852.

Atlanta. Probably Christmas Day, 1855.

A 2. If it is a municipal plant, was gas being supplied by a private company when city began operation?

Wheeling. Yes.

Norfolk. ——

Atlanta. ——

A 3. Character of original organization, whether individual, firm, corporation, municipal, or other form.

Municipality.	*Origin of Company.*	*Date of Municipalization.*
Wheeling	Co., private charter, Mar. 18, 1850	Ordered, Nov. 16, 1869. Possession, June 1, 1871.
Norfolk	Co., private charter, Jan. 11, 1850.	
Atlanta	Co., private charter, Feb. 16, 1856; Preliminary contract with Wm. Helm, Apr. 5, 1855.	

A 4. Character of present organization, whether individual, firm, corporation, municipal, or other form.

Wheeling. City gas works, under three trustees appointed by Council.

Norfolk. City Gas Company of Norfolk; corporation, agreement of June 17, 1896, consolidating the City Gas Light Company of Norfolk, chartered by special act of January 11, 1850, and the Norfolk Gas and Electric Company, chartered June 2, 1896, by the Corporation Court of Norfolk on petition dated May 29, 1896.

Atlanta. Corporation, Atlanta Gas Light Company.

A 5. Date and character of all changes in ownership since origin.

A 6. State method of making each change.

A 7. State terms of each arrangement.

Wheeling. Under charter, March 18, 1850; ordinances, April 23, 1849; April 29, 1850; company had exclusive franchise, thirty years, with right of city to purchase after twenty years. Price to be fixed by three arbitrators, to exclude consideration for franchise and good will. Council ordered taking of works November 16, 1869; notice to company December 14, 1869; additional notice December 8, 1870; proposition of company to reduce the price rejected by Council, January 3, 1871; award of arbitrators, May 23, 1871, of $178,637.50. June 1, 1871, the city took possession of the works, and the next day stationed policemen over the works for nearly two weeks. Although the company appointed its arbitrator under Section 17 of its charter, it took but little interest in the arbitration, and continued through its officers to within an hour or two of the time when the city took the works to believe and proclaim that the city could not raise the money to take the works. Upon the refusal of the officers of the company to receive the amount of the award, the money was deposited in bank to the credit of the company, and the city took possession. The company then entered suit, and carried it to the Supreme Court. (Printed record, 226 pp. Reports of Supreme Court of West Virginia, Vol. 5, pp. 448 to 497.)

The alleged grounds for the contest of the award were:

(1) That the decision of the arbitrators was not unanimous, the arbitrator appointed by the company refusing to sign. (Although the arbitration board sat for several months, the record shows that the other members thought the third member would sign the award until the day the award was made, although the arbitrator on the part of the company had appeared very indifferent during the procedure.) The Court, sitting in chancery, declared it had no jurisdiction on this point.

(2) The second ground of contest was that the arbitrator appointed by the city had been throughout acting as a partisan and an advocate. The Court found that said arbitrator had so acted, and that such action would have invalidated the award had it been made to appear to the Court that either party to the arbitration had sought an impartial tribunal. On the contrary, Eoff, the arbitrator appointed by the company, was at the time of the arbitration the owner of 118 shares of the stock; the third arbitrator, appointed by the other two, was a former secretary and manager of the company. Many of his relatives were at the time of the arbitration stockholders in the company, and this arbitrator was suggested by Eoff. The Court sustained the award on the specific ground that each party had knowingly appointed a partisan, and without objection each had accepted the partisan nominated by the other. While the fairness of the amount of the award was not before the Court, the Court declared that so far as the evidence showed, the award was a reasonable one in amount.

(3) The third ground was that while the other two arbitrators were sworn to the faithful performance of their duty, Eoff, the arbitrator on behalf of the company, refused to be sworn on the ground that the statute did not require the arbitrators to be sworn.

When the city resolved to buy the works, it attempted to do so without resorting to arbitration. The company put in an itemized schedule of its property, with a claim for $177,181.54, and demanded in addition to this "payment of the value of all materials on hand at the time of the sale of the works." (Record, pp. 37-38.) The arbitrators fixed the value at $73,637.50, including the materials.

Norfolk. Original company: private charter, January 11, 1850, City Gas Light Company of Norfolk; charter renewed, January 18, 1884; amended, and renewed for thirty years, January 31, 1890. Charter of the Norfolk Gas and Electric Company, granted by the Corporation Court of Norfolk on June 2, 1896, upon petition dated May 29, 1896. On June 17, 1896, the Norfolk Gas and Electric Company and the City Gas Light Company of Norfolk were legally consolidated, becoming the City Gas Company of Norfolk. April 1, 1898, the City Gas Company sold to the Virginia Electric Company, chartered by Act of February 23, 1898, all the machinery and personal property used by it in connection with its electric lighting business.

Atlanta. The company has continued under the original name and charter, as amended, special act of October 14, 1889, authorizing the company to furnish electricity—a grant which it has never acted under. About April 1, 1889, the United Gas Improvement Association of Philadelphia bought all the stock of the company, which it exchanged June 1, 1905, for stock in the Georgia Railway and Electric Company. The railway company has deposited the stock in trust with the Old Colony Trust Company of Boston.

A 8. State fully the reasons for each change.

Wheeling. From the foundation of the company up to 1858 and 1859, the company, having an exclusive franchise, charged the maximum statutory price of $3.50 per thousand to private consumers. At that time indignation meetings were held throughout the city, and large numbers of consumers entered into an agreement, which they put into effect, to discontinue the use of gas. From that time until the city took the works, the company gave a discount of 10 per cent. for prompt payment. Although the stockholders had never contributed but $50,000, the share capital in 1870 was $121,375. The company had always paid large dividends, and for the last 15 years before 1870, the dividends averaged from 12 per cent. to 24 per cent. annually, and were increasing. The last dividend paid before the City took the works was 10 per cent. for the half year. The previous year the cash dividend was 24 per cent., and the stock was selling in recent years at a premium of from 60 to 80 per cent. (Record, pp. 112-113.) The company in 1850 paid for construction of the works, $31,000. (Construction contract, pp. 123-126 of Record.)

A 9. Has there ever been municipal ownership and private operation of plant?

In no instance.

A 10. Is the general sentiment favorable or unfavorable to the present system of ownership and operation?

A 11. What is the attitude of the press?

A 12. State current objections to the present system.

Wheeling. Sentiment of the public and press generally favorable to public ownership, yet the belief is universal that the works are running down. Nearly everyone says that he prefers this condition to the dangers of monopoly with a private company. The management is interwoven with politics; appointments in the gas department are parcelled out and controlled by the Councilmen. All employees are supposed to belong to the party in power. Should that party change, it is probable that the whole force in the department would be changed. All employees are regularly assessed for campaign expenses. The following assessment for the last election is taken from the original assessment sheet of the Executive Committee of the Republican Campaign Committee:

Twenty-eight men pay $5.00 each.
Superintendent, $75.00.
Engineers, $10.

Purifiers, $10.
Secretary, $60. (Said to have been reduced from $75 upon petition.
Superintendent of Electric Plant, $40.
Assistant Secretary, $15.
Collector, $15.
Meter readers, $10.
Inspector, $20.
Two engineers, $20 each.
Linemen, $15.
Chargers, etc., $2.
Lamp trimmers, $8.

Norfolk. Public sentiment generally favorable, but people unusually ready to believe in lower prices through competition. The sentiment of the press is naturally favorable from the fact that the company advertises very largely, especially when there is talk of competing franchises, as during the last two years. While there is no serious complaint of the company, the people seem ready to believe anyone who promises cheaper prices through competition.

Atlanta. At the time of my visit, the attitude of the press and the public was apparently favorable to the company. Since that date an attorney who is a member of the Council has raised the question of the right of the company to furnish gas beyond the original one-mile limit of the city, or to sell gas for any purpose except illumination, and has also questioned the perpetual character of the charter. The City Attorney has supported the movement by a favorable opinion. The Council referred the matter to a committee of five, of which the instigator was the chairman. I am informed under date of September 7, 1906, that the committee reported, by a vote of three to two, against the views of the chairman, and that the Council has not acted upon the report. A newly-founded newspaper has taken up the agitation, and advocates municipal ownership in general, demanding the municipalization of the gas plant first. An official of the company under date of October 10, 1906, states that he believes the activity of this newspaper is "to build up subscription lists more than anything else."

A 13. Do the citizens take an active interest in the management of the plant?

Wheeling. No. Everybody acknowledges that the condition of the plant is bad because of the rotten condition of politics. The public seems to be hopeless in regard to improving political conditions.

Norfolk, Atlanta. No.

A 14. Have there ever been competing gas companies in the city?

A 15. Are there competing companies now?

A 16. If private companies have consolidated, give dates and methods briefly.

Wheeling. There has never been any attempt at competition with artificial gas. The original company charter was exclusive, with statutory contract price of $2.50. For description of natural gas franchises see D 26, and especially D 58. There is no competition at present with artificial gas. Natural gas companies have consolidated, or, at least, act in unity, and do not compete. I was unable to find evidence of direct purchase or of formal agreement, but the Virginia Oil and Gas Company (ordinance of July 15, 1904, giving the right to pipe the whole city), is furnishing no gas in Wheeling except to the city water works. It pipes gas through Wheeling to Martin's Ferry.

Norfolk. There never has been any attempt at competition. A competing company (Norfolk Gas and Electric Company) was chartered by the Corporation Court, but solely for the purpose of being consolidated with the old company, and with no intent of competing. The Norfolk Gas and Electric Company and the City Gas Light Company of Norfolk consolidated under the name of the City Gas Company of Norfolk June 17, 1896, being specifically authorized to buy, sell, lease, or consolidate their respective properties and franchises by their respective charters. The authorized capitalization of the new company was $500,000 in shares and $500,000 in bonds. The securities of the new or consolidated company were exchanged for securities of the old companies; the City Gas Light Company receiving nine-tenths of the stock and nine-tenths of the bonds; the Norfolk Gas and Electric Company receiving one-tenth of the stock and one-tenth of the bonds of the new company. The agreement of consolidation authorized the cancellation of the securities of the old companies; that is, the promoters organized the Norfolk Gas and Electric Light Company and also the City Gas Company of Norfolk for the purpose of buying and reorganizing the City Gas Light Company of Norfolk. April 1, 1898, the City Gas Company of Norfolk sold its electric lighting privileges and property required for the same to the Virginia Electric Company for $40,000 of the capital stock of the electric company and $40,000 in 5 per cent. bonds of the electric company; the electric company agreeing not to sell or make gas within Norfolk County except for its own use, and the gas company agreeing not to make or sell electricity within Norfolk County.

Atlanta. Yes. The Gate City Gas Light Company was chartered by special act of February 4, 1875, with the same rights and privileges as those held by the Atlanta Gas Light Company, except that the charter was limited to thirty years. The company did not organize until 1883. The city contested its right to lay pipes, but lost in the Supreme Court. (The Gate City Gas Light Co. vs. City of Atlanta (1883), 71 Ga., 106.) The company piped the central portions of the City, and at the time of the legal trial was said to have spent $140,000 for land, material and works. At the time of the consolidation of the companies the Gate City company was supposed to furnish about 20 per cent. of the total gas consumed in Atlanta. The company was financially unsuccessful, and about January 1, 1889, was purchased by the United Gas Improvement Association of Philadelphia. In April, 1889, the

Philadelphia company purchased the shares of the Atlanta Gas Light Company. Then the Atlanta company bought all the property of the Gate City company, and surrendered the Gate City company's charter to the State. There has been no competition since. The actual competition was confined to something like two years, as the Gate City Company did not begin to distribute gas until 1887.

A 17. If present company is a subsidiary or a leased company,

(*a*) Give name and address of controlling company, or

(*b*) Lessor, and

(*c*) Date such control began, or

(*d*) Date of lease.

Wheeling. Inquiry not applicable.

Norfolk. A majority of the stock of the City Gas Company of Norfolk is owned by the Norfolk Railway and Lighting Company, 82 Plume street, Norfolk, Va. Such holdings are said to amount to from 80 to 95 per cent. of the capitalization. These shares are supposed to have been acquired by purchase in the open market at different and unknown dates.

Atlanta. The gas company is a subsidiary company in the sense that the shares are owned outright by the Georgia Railway and Electric Company, Fairlie and Marietta streets, Atlanta, Ga., a Georgia corporation, which came into possession of the gas shares about July 1, 1903.

A 18. Population of city at last national census.

A 19. Estimated population January 1, 1906.

A 20. Source of such estimate.

Wheeling. Census of 1900, 38,878. Estimate, March 1, 1905, Board of Education, 41,768.

Norfolk. Census of 1900, 46,624. Estimate, January 1, 1906, 60,000, based on established rate of increase, including annexed territory (Berkely, 1900, 7,581). Negroes, about 43 per cent. of total.

Atlanta. Census of 1900, 96,550. Estimate, January 1, 1906, City Directory, 110,250. About 45 per cent. negroes.

A 21. Are there electric works in the city which compete with gas?

A 22. Were these public or private?

A 23. If private, were they owned or controlled by the same persons controlling gas works?

In all three of the cities there are private electric companies.

Wheeling. There is a public electric plant which does public lighting only. So far as known the Wheeling Electric Company is independent in ownership of the natural gas companies.

Norfolk. The private electric company controls the gas company. While the corporations are distinct, there is a large common ownership of shares.

Atlanta. The electric company owns the gas company.

B—SUPERVISION OF MUNICIPALITIES.

The questions in Schedule I B do not apply to Norfolk and Atlanta, but to Wheeling only.

B 1. Does municipality have power

(*a*) To construct its own gas plant, when there is no private competing plant?

(*b*) To construct its own gas plant without purchasing existing plant?

(*c*) To condemn private plants under the right of eminent domain?

(*d*) To purchase private plant?

(*e*) To operate the plant when constructed or acquired?

(*f*) To condemn property for additions to plant?

B 2. How was the power conferred, by

(*a*) General law applicable to all cities of the State? or

(*b*) General law applicable to all cities in a class? or

(*c*) Special act applicable to this city alone? or

(*d*) Administrative order? or

(*e*) Other methods.

Wheeling. Wheeling is covered in regard to its gas supply entirely by special legislation. The charter of the original gas company gave the city the *right* to purchase, maintain, and operate the company, a right which was confirmed by special act of February 17, 1891, and again re-confirmed by act of January 21, 1901. This legislation gave the power to construct, purchase, and operate gas works; while the power to condemn private property for any lawful purpose came from the Laws of Virginia, 1834, Ch. 121. There can be no doubt that under this legislation granting the power to purchase and construct, the establishing and maintaining of gas works became a lawful purpose of the city. It is plain from the whole legislation that the rights conferred are independent of the existence of any other company, but the right does not include the right of eminent domain over private gas plants (property already devoted to a public use), but does include the right to condemn private property for additions to the plant.

B 3. Does the city have power for the construction or acquisition of gas works; to raise money by (*a*) taxation?

Wheeling. Yes.

(*b*) By the sale of bonds?

(*c*) Other methods?

Wheeling. Yes, the Act of March 1, 1870, authorizes the city to borrow money, from time to time upon such terms and for such time as may be agreed upon, to purchase the gas works.

B 4. What is the limitation upon the city's taxing power for municipal gas works?

Wheeling. No separate limit for gas works.

B 5. What is the limitation upon the general taxing power of the city?

Wheeling. By the Act of February 15th, 1905, not to exceed 50 cents on the hundred dollars; and for 1905, not to exceed the aggregate amount assessed for 1904 by more than 5 per cent.; for 1906, not to exceed the assessment of 1904 by more than 7 per cent.; for 1907, not to exceed the assessment of 1904 by more than 9 per cent.; but the limit may be extended by order of the Council, approved by popular vote with three-fifths majority. The order for the increased levy submitted to popular vote must contain the proposed rate.

B 6. What is the limitation upon the city's power to incur debt for municipal gas works?

Wheeling. There is no separate limit for this purpose to-day. The Act of March 1, 1870, authorizing a loan to purchase the old company, authorized as large a loan as the city deemed necessary to purchase under the terms of the charter of the company.

B 7. What is the limitation upon the general power of the city to incur debt?

Wheeling. By the Act of February 11, 1905, in effect January 1, 1906, no city may in future create indebtedness which will, with existing indebtedness, exceed 2½ per cent. on the assessed valuation of the real and personal property. At the same time, the city must provide for a direct annual tax sufficient to meet the annual interest, and to pay the principal in a period not exceeding thirty-four years. Every loan, with all questions connected with it, must be submitted to popular vote, and must receive at least three-fifths affirmative vote of all those voting on the question.

B 8. State fully step by step the procedure which much be followed and the requirements which must be met before the city may construct or acquire a plant; also the source of each provision, whether State Constitution, statute or ordinance. Note particularly the requirements as to initiation of proposal, special action by the city authorities before its adoption, mayoralty veto, referendum, publicity, making of appropriations, bond issues, and approval of scheme by courts or state authorities.

Wheeling. The charter of Wheeling Gas Company, Special Act March 18, 1850, Section 5, authorizes the city to subscribe for not exceeding $50,000 of the stock of the company. Section 17 gave the company the exclusive franchise for thirty years, and gave the city the right to purchase upon six months' notice at the end of twenty years or at the end of any succeeding period of five years. The company, under the charter, was compelled to sell at the option of the city, as above, at a price to be fixed by arbitrators in case of non-agreement. "Upon said purchase being made as aforesaid, this charter, together with all franchises, rights and privileges granted or intended to be granted under it, shall be vested in the said City of Wheeling for the common benefit of the inhabitants thereof." Under this provision the city actually purchased and took possession of the works and franchises on June 1, 1871, as explained under question A 8. By Act of March 1, 1870, the Legislature authorized the city to borrow sufficient funds to buy the company. On June 24, 1871, the Council passed an ordinance providing for the management of the works by three trustees, to be elected by the Council (two-year terms), salary $100.00 per year. The trustees were to appoint all officials and employees for the works, and to pass rules and regulations for managing the works, which rules and regulations were subject to the approval of the Council. The amendment to the city charter re-enacted the provisions with reference to the management of the gas works with some elaboration, Act of February 27, 1882. Pursuant to the Act of 1882, the Council on March 25th, 1884, passed an elaborate ordinance for the management of the gas works and approved the extended code of forty rules, which had been previously adopted by the trustees of the gas works. On February 17, 1891, the Legislature re-enacted the gas legislation, combined with an act authorizing the city to generate and sell electricity; but before the city could engage in commercial electric lighting, it was required to buy the works and equipment of the Wheeling Electric Company, so far as same were used in generating or distributing electricity for lighting purposes. The city was required to buy if the company desired to sell, the price to be settled by arbitrators in case of disagreement. This statute was re-enacted January 31, 1901, with the added provision that the city must purchase all the physical assets of the electric company situated in the City of Wheeling (whether used for lighting or not). Under both the Acts of 1891 and 1901, the city was to have the right to construct and operate electric works for all purposes without regard to the Wheeling Electric Company, in case the company refused under the act for thirty days to appoint an arbitrator, or after the award of the arbitrators refused for thirty days to turn over the property to the city. By an act February 23, 1877, the city was prohibited from appropriating money or entering into any contract or passing any ordinance, except such be passed by a majority of the members of the Council (both branches) present at two consecutive meetings, or at one meeting, by a two-thirds majority of those present. By Section 17 of the charter, one-fifth of the members may demand a yea and nay vote of record. By an act of December 22, 1876, the Circuit Court may supersede, revoke and annul any ordinance of a city made contrary to law. By the rules of the government of the Council, it is provided (Rule 13) that every member present is to vote, except those excused for special reasons by the Council. Rule 13 requires every motion to be put in writing at the request of the Chairman or any member. Rule 21 permits any two members to ask for the yeas and nays, but permits amendments before the main question is put. Rule 22 gives any two members the right to have a written protest entered on the journal against any ordinance or resolution; and Rule 28 requires all ordinances except appropriation ordinances to be introduced by a member and to be referred to a committee for a report at a subsequent meeting. By Rule 30, all ordinances shall be read the first and second time in full, and the third time by title only. The same rule requires an ordinance to be read in full when it is introduced, but not more than once at that meeting. Rule 31 requires that the successive meetings required for appropriating money or for passing contracts by a mere majority shall be held on separate days. By Rule 32, propositions involving the expenditure of money shall originate in the second branch; they may be amended in the first branch if the expenditure is to be more than $100.00; vote must be by yea and nay. By Rule 34, all committee reports must be in writing with recommendations. Rule 55 forbids the reconsideration of any vote of the Council except at the meeting at which it is passed. The mayor has no veto. There is no referendum, except that every bond issue must be submitted to popular vote by Act in effect January 1, 1906 (see answer to question B 7). There was no provision for publication, before an ordinance is passed, until the act of February 18, 1901. This act requires thirty days' notice by publication "stating the object of such franchise" in some newspaper published in the city, no franchise to be granted within thirty days of the application nor until all interested parties have had an opportunity to be heard. The act permits the renewal of existing franchises for fifty years. (53 W. Va., 465, City of Benwood *vs.* Wheeling Railway Company.) Franchises are limited to fifty years.

By Section 25, Act of January 21, 1881, prescribing duties of the Clerk, it is made the duty of the Clerk "when required by the Council," to publish for at least one week every ordinance and rule of the Council. By an act of February 20, 1877, the Joint Committee on Lights is required to present estimates of the expense of the ensuing year on the first Tuesday of May, and within the months of May and June the Council shall determine by ordinance "the amount required to meet the expenses of lighting the said city, and the purchase, erection, and repair of lamps and posts." A greater amount shall not be spent for this purpose during the year, except the extra appropriation be passed by a four-fifths vote of the Council, or unless such an appropriation be passed by a two-third vote of the members present at each of two successive Council meetings, held on different days. By ordinance of January 21, 1881, the Clerk is prohibited from drawing a draft against any appropriation passed by a preceding Council, after the new Council has held its first meeting. Section 35 of the same ordinance requires the Clerk at the first meeting of each month to make a report showing the undrawn balances of each appropriation. The act of December 2, 1875, forbids the creation of any debt except by the issue of bonds under this act, and forbids the voting on more than one bond issue at any election. The proclamation setting forth such ordinance must state the amount of city debt authorized, and the amount issued. All bond issues must be sold to the highest bidder, after four weeks' advertisement, and be paid for in cash or the equivalent in Wheeling city bonds. Bonds must run from 10 to 34 years, bear not to exceed 10 per cent. interest, and be sold at not less than par. Penalty for violating any provision of this statute, from $50 to $500, and from ten days to six months imprisonment.

B 9. If the municipality is required to pay taxes or fees in regard to its plant to other governmental authorities, explain system.

Wheeling. No such payments.

B 10. Give statutory provisions regarding the purchase of private plants by the city.

Wheeling. Answered under B 1 (*d*).

B 11. Give statutory provisions regarding the condemnation of private plants by the city under the power of eminent domain.

Wheeling. By Chapter 46, City Charter, the City Council may take by condemnation any private property for any public purpose. The constitution of West Virginia, Article 3, Section 9, specifically prohibits the Legislature from granting away the right to condemn property and franchises of incorporated companies. I find no evidence that the Legislature has ever delegated the right to the city to take by condemnation property already devoted to public purposes. It will be recalled that under Acts of 1881 and 1901, explained in the answer to B 6, the city was given the right to purchase gas or electric plants at an appraised valuation, provided the companies wished to sell, and to compete with the companies in case they did not sell under the acts.

B 12. Give statutory provisions regarding area which may be served by the municipal plant.

Wheeling. The area of the "City of Wheeling" designated in Section 8, Charter of the Gas Company, March 18, 1850, which provision is carried over into all the later legislation. This applies to both public and private lighting.

B 13. Give statutory provisions regarding the nature of plant and equipment.

Wheeling. The charter of the original company, which charter with all of its powers, passed into the ownership of the city, and may be considered as amended by the Acts of 1881 and 1901, gives blanket authority to erect any and all works, pipes and apparatus necessary for manufacturing, distributing and selling gas; the manner of executing this power is, and was under the old charter, left entirely to the discretion of the company, and under present legislation, to the city.

B 14. Give statutory provisions regarding extensions, improvements and new processes.

Wheeling. No provision except as explained under questions B 12 and B 13.

B 15. Give statutory provisions regarding price of service, arrangement of charges, discounts, deposits, etc.

Wheeling. Under the statutes, these matters are left entirely to be governed by the rules and regulations of the trustees of the gas works, under general direction and approval of the Common Council. Under these statutes, matters are now regulated by the rules of the gas trustees, approved by the Council March 25, 1884, as amended, by the additional rules No. 41 to 50, inclusive, adopted July 20, 1897, and the amendment to rules No. 29 to No. 30, adopted July 20, 1897. The additional rules and amendments deal almost entirely with the licensing of gas fitters, taking security from them, and with the materials to be used in gas fitting. (Copy of the rules is hereto annexed.) Under the statutes, the price of gas is left entirely to be determined by the trustees with the approval of the Common Council. From the formation of the company up to 1858-9, the company having an exclusive franchise, charged the maximum statutory price, $3.50 per M. to private consumers. See answer to question A 8. From that time until the city took the works (June 1, 1871), the company gave a discount of 10 per cent. for prompt payment. By Section 10 of the ordinance of June 23, 1871, the price was made $2.80 with a discount of 10 per cent. for payment within ten days. By ordinance of April 30, 1875, it was made $2.30 with 10 per cent. discount if paid within ten days. By ordinance of January 5, 1877, the price was made $1.80 with 10 per cent. discount if paid within ten days—from February 1, 1877. By ordinance of April 8, 1879, in effect May 1, 1879, the price was made $1.20, with 10 per cent. discount as above. By ordinance of August 14, 1883, the price was made $1.00 with 10 per cent. discount as above. By ordinance of January 10, 1888, the price was made $1.00 with 25 per cent. discount for payment at the gas company's office on or before the tenth day of the month.

B 16. Give statutory provisions regarding the character and quality of the service.

Wheeling. These matters are left entirely to the trustees, under approval of the Council.

B 17. Give statutory provisions regarding performance of public work by contract or direct employment.

Wheeling. While the Board of Public Works, by ordinance of June 26, 1888, has supervision over the laying of all water and gas pipes (Rule 5), and while that Board, under Rule 4, must, for all public works carried on by it, in cases where the works cost more than $5,000, advertise for a reasonable time for proposals for the whole work. I cannot find that the latter rule applies to work done by the gas department. There are no statutory or ordinance requirements regulating that matter. As a matter of fact, the Gas Department has for many years employed direct labor and bought all of its more important materials and supplies, by advertising for proposals without binding itself to accept the lowest bid. The advertising seems to be simply for the purpose of letting people know that certain things are needed. The language of Section 3 of ordinance passed April 14, 1883, entitled "An ordinance to keep disbursements of the city of Wheeling within its revenues," requires the gas trustees, in connection with the Committee on Lights, to make estimates of the needed expenditure for the year, and the Council (Section 5) to pass the annual appropriation bill. It binds the Council not to change the price of gas without the consent of the trustees within the year, and Section 6 authorizes the trustees to make contracts without the control of the Council, amounts not to exceed in the aggregate the amount appropriated by the Council for the year. The ordinance makes any official or board incurring or making contracts in excess of the appropriation personally liable for the debts and contracts in excess of the appropriation, and in addition liable to a fine of $20 to $100.

B 18. Give statutory provisions regarding letting of public contracts.

Wheeling. There are no provisions except as explained elsewhere (B 8 and B 17).

B 19. Give statutory provisions regarding the issuance of bonds.

Wheeling. Answered under B 5 and B 7.

B 20. Give statutory provisions regarding the use of income or any portion thereof.

Wheeling. Under the rules and regulations of the trustees of the gas works, Rule 6, approved by Council March 25, 1884, all moneys received by the trustees from the sale of gas, from by-products, or from other sources, shall be deposited in a bank to the credit of the "trustees of the gas works of the City of Wheeling." This money can be drawn only on orders of the trustees and on checks signed by a majority of the trustees and the Secretary. By Rule 4, the trustees are empowered and required to maintain and operate works and pay the bills therefor. An ordinance of May 12, 1885, providing for a loan to pay the floating debt and to pay the portion of the (gas) loan of June 14, 1871, still outstanding, authorized a loan of $200,000 payable in 1910. Section 14 of the act, which reads in part as follows: "Inasmuch as it is not permitted by the constitution and laws of the state to provide for the redemption of bonds to be issued under this ordinance otherwise than by levy of direct annual taxes, and it is intended in the adoption of this loan ordinance not to cause any increase in the direct taxation; therefore, to provide as far as possible against any such increase, it is further ordained that there shall be paid into the City

Treasury from the revenue of the city water works and the gas works in equal parts" on July 1st of each year, beginning July 1, 1886, and continuing until 1895, an amount equal to the annual interest on the unredeemed portion of this loan outstanding, and from 1895 to 1919 a sum annually equal to one-twenty-fifth of the principal of the loan outstanding July 1, 1895, and in addition a sum equal to the annual interest falling due each year on the portion of the bonds outstanding. Such sums, so paid in, shall be used for the current expenses of the city. Before the adoption of the present Code of rules of the gas trustees in 1884, the trustees were compelled by Section 8 of the ordinance of June 23, 1871, to pay over once a month to the sinking fund commissioners or trustees created by the loan ordinance of November 27, 1860, all moneys received by them from all sources. The gas trustees under Section 9 of the ordinance were to draw checks on the trustees or commissioners of the sinking fund for all expenses of the gas works.

B 21. Give statutory provisions regarding depreciation.

Wheeling. This matter not being mentioned, it is left to the discretion of the gas trustees under control of the Council.

B 22. Give statutory provisions regarding sinking funds.

Wheeling. Answered under B 20.

B 23. Give statutory provisions regarding audit of accounts.

Wheeling. Rule 8 of the gas trustees provides that either the Board of Trustees or the Council has authority at all times to engage an expert accountant to examine the books and accounts of the Gas Department.

B 24. Give statutory provisions regarding the publication of reports.

Wheeling. Under the Act of February 27, 1882, Section 10, all boards and trustees must, once in three months, and oftener if required, report their receipts and disbursements to the Council (meetings of the Council are public) and by Rule 10 of the gas trustees, the Superintendent of the gas works shall report to the trustees at their monthly meeting in regard to materials on hand. Under the ordinance of June 23, 1871, the gas trustees were required every three months, and oftener if ordered, to make a full report to the Council of their receipts and disbursements. By ordinance of July 25th, 1899, the Secretary of the Gas Board is required to submit to the Council Committee on Accounts, on the Friday preceding the Council meeting, a detailed report, including vouchers and invoices, of all expenditures made by the Board since the next preceding regular meeting of said committee, and the committee is required to report thereon to the Council. By an ordinance of January 21, 1881, Section 21, the City Clerk is required to make a report of receipts and expenditures of the whole city, on or before the second Saturday in January, to the committee on accounts, and when such report has been passed on by the committee and approved by the Council, it shall be published in some newspaper printed in the city. The general statute of February 24, 1905, requires all municipal corporations to publish in two newspapers of opposite political faith, if there be such in the city, and if there be no newspaper in the city, in pamphlet form, a detailed annual financial statement (form not prescribed), including a statement of the debt of the city, all sworn to by the Recorder, Mayor and two members of the City Council. (Penalty for every member of the Council and the Recorder of not less than $10 nor more than $100.) The prosecuting Attorney of the County is required to present evidence of the violation of this act to the Grand Jury.

B 25. Give statutory provisions regarding salaries paid.

B 26. Give statutory provisions regarding wages of day laborers.

Wheeling. The amendment to the city charter of February 27, 1882, Sections 43 and 46 of Chapter 52, gave to the gas trustees complete control of the personal staff and the fixing of their salaries, subject to the approval of the City Council. No. 1 of the rules of the gas trustees, approved by Council March 25, 1884, specifically required the appointment of employees and their respective salaries to be confirmed by the Council. These powers were granted to the company by its charter (March 15, 1850) and under the charter passed in full to the city with the transfer of the works.

B 27. Give statutory provisions regarding hours of labor of day laborers.

Wheeling. By ordinance approved August 18, 1887, all laborers who are working directly on the street for the Board of Public Works, the water works, or the trustees of the city gas works, but not those working for contractors for these boards, shall work but nine hours per day for a day's work, and shall be paid for overtime. Penalty for violating this clause, $5.00 to $50.00.

B 28. Employees' pensions.

B 29. Strikes.

B 30. Citizenship of employees.

B 31. Other important matters.

Wheeling. No provisions on these subjects.

B 32. Are the laws relating to the construction and operation of works applicable to municipal and private plants alike?

Wheeling. There is no general legislation bearing on gas companies save the general provisions of the corporation laws applying to all sorts of corporations, with the exception of a few provisions applying to pipe lines for natural gas. Section 1988 of the General Statutes, edition of 1906, giving councils of cities, towns and villages the power "to erect, or to authorize or prohibit the erection of gas works," etc., does not apply to Wheeling. The substance of Section 29, City Charter of March 11, 1836, has been carried into all later revisions of the charter, and it is much broader than the usual American clause, permitting the Council to do almost anything it is not specifically prohibited from doing. The Council plainly has the right under this clause to grant franchises (Charter burg Electric Lighting Co. *vs.* City of Clarksburg—47 W. Va., 742). Its right to establish and maintain public gas works rests upon special provisions explained elsewhere. The right of Wheeling and other cities to grant franchises is clearly implied in a general act of February 18, 1901, regulating the method of granting them. (53 W. Va., 465—City of Benwood *vs.* Wheeling Railway Company.)

B 33. If there are any differences, state them.

Wheeling. There are no differences.

B 34. If any state board, commission or other authority, has the control or supervision of municipalities as regards gas works, give statutory provisions relating to powers and functions.

B 35. What has been the effect of this supervision?

Wheeling. No supervision.

B 36. Does the municipality make regular reports to state boards or commissions as to the results of operation?

Wheeling. No reports to any supervising body, but see B 24. Constitution, Article 6, Section 27, requires the Legislature to provide by law that all public officials, State or local, who receive, collect or hold public moneys, shall make annual account and statement, which account shall be open to the public at such suitable place as may be appointed by law. The Legislature seems to have made no provision for making this account.

B 37. Is there any authority not connected with the municipality itself which tests gas and character of the service?

B 38. Are the results of such examination published?

B 39. If judicial or administrative orders have been issued by the State authorities relative to the municipal gas works, state them and give source and date of issue.

Wheeling. There are no provisions bearing on these subjects.

B 40. Has the municipality unrestricted powers regarding its own gas plant; (*a*) to fix rates charged for gas; (*b*) to fix rates charged for meters, appliances, etc.; (*c*) to raise money by taxation to defray current expenses?

Wheeling. Yes. Within the general tax limit as explained in the answer to question B 5.

C—PUBLIC SUPERVISION OF PRIVATE COMPANIES.

Questions C 1 to 57 do not apply to public undertakings, hence not to Wheeling.

C 1. Date of incorporation of company.

Norfolk. Original company, January 11, 1850; present company, June 17, 1896.

Atlanta. February 16, 1856.

C 2. Place of incorporation of company.

Norfolk. Original company, Richmond, Va.; present company, Norfolk, Va.

Atlanta. Atlanta.

C 3. Was incorporation under (a) general law, (b) special act, (c) administrative order, (d) other method?

Both the companies, that is, the Norfolk and the Atlanta, were chartered by special legislative act; the first, January 11, 1850; the second, February 16, 1856.

C 4. For what length of time was the original incorporation to be effective?

Norfolk. The original charter contains no time limit. Certain amendments to the charter have been limited to thirty years; certain others are at the discretion of the Legislature, but these amendments are not supposed to have abrogated the perpetual feature of the original charter.

Atlanta. Perpetual.

C 5. If this duration has been extended or decreased, state when, how, for what periods of time, and reasons therefor.

Norfolk. This charter was renewed January 18, 1854, amended without change of duration; and further amended by Act of January 21, 1890. The amendments under this act were limited to thirty years, and June 2, 1896, a charter was granted by the Corporation Court of Norfolk to the Norfolk Gas and Electric Company without time limit. On June 17, 1896, the Norfolk Gas and Electric Company of Norfolk, and the City Gas Light Company of Norfolk were legally consolidated by agreement specifically authorized in their respective charters.

Atlanta. There has been no change in the time limit.

C 6. Was the power of amendment or alteration of this original charter reserved to the State?

Norfolk. No. The original charter of the company was a perfectly vague and blanket one, with no specific reservations to the State. The company has always claimed, and with apparent correctness, that the charter is a contract on the basis of the Dartmouth College case, and has always been very careful not to accept any amendment which would infringe upon this right. The matter has never been litigated, although the company seriously maintains that the recent creation of the State Corporation Commission, with such sweeping powers of control and even the laying of an annual registration fee, is in violation of the contract rights of the company. It would appear probable that uniform rates, license fees, requirements of reporting and auditing can be enforced against the company under the general police power, and sovereign right of the State without any infringements of the provisions in the Federal Constitution against confiscation or violation of contracts. The State Constitution adopted in 1902, especially sections 156, 160, 162 and 164, is quite the most drastic in regard to corporations of all American constitutions that have come under my notice. Section 156 is as follows: "The right of the Commonwealth, through such instrumentalities as it may select, to prescribe and define the public duties of all common carriers and public service corporations, to regulate and control them in the performance of their public duties, and to fix and limit their charges therefor, shall never be surrendered or abridged." The acts of April 15, 1903, and of January 18, 1904, are quite as drastic as the most liberal interpretation of the constitutional provisions will permit. Section 8 of the Act of 1904 is as follows: "The charter of every public service corporation heretofore or hereafter incorporated may be repealed by any future Legislature, except that no law shall be passed for taking from a company its works or property without making it just compensation." Whether or not these sections can be reconciled with the contract theory of charters, the court alone can determine. Article 12, Section 63, of the Constitution, forbids granting any special or exclusive right, the amending, renewing, extending or changing the name by special legislation, of any public service corporation. It also forbids the remitting of the forfeiture of the charter of a corporation unless the corporation agrees to accept its charter subject to this Constitution. By Section 64, all general laws are subject to amendment or repeal, and all companies exercising the right of eminent domain, or occupying any street, alley or public highway, are public service corporations. Section 154 forbids the Legislature to regulate the affairs of any corporation by special legislation, but permits repeal where that right exists by special act. Section 159 of Article 12 expressly reserves to the Legislature the right of eminent domain over the property and franchises of corporations. Section 163 forbids a foreign corporation to acquire, lease, use or operate any public or municipal franchise or franchises except such as it possessed when the Constitution went into effect.

Atlanta. No. Charters recently granted are limited in time, Code of 1861. Section 1632. By Section 1637 of the same code it is provided that no charter previously granted without the reservation of the right of repeal shall be subject to dissolution at the will of the State, but by the Constitution of 1867, Code Section 5799, latest edition, it is expressly provided that charters previously granted and not subject to repeal shall not be amended unless the company will come under this Constitution. Under the Constitution of 1867, Code 5798, the State reserves large power over corporations.

C 7. State succinctly the powers conferred by this charter.

Norfolk. The power "to construct suitable works for the manufacture, sale and distribution of gas from bituminous coal or other substances for the purposes of public and private illumination" within the City of Norfolk. Real estate limited to three acres. Company subject to "an act prescribing general regulations for the incorporation of manufacturing companies, each share one vote, share capital of not less than $20,000 nor more than $100,000, and giving the right to open streets, alleys, etc., of the City of Norfolk in order to lay pipes, without the consent of the city. Company required to put opened streets in repair at its own expense. Penalty for interfering with the property of the company,

$10 to $20, one-half to the informer, the other half to the city. Double damages to the company. City of Norfolk given right to protect property of company by ordinance under penalty.

Atlanta. The company was authorized to construct works, lay pipes, and to make and sell gas for public and private use by any method and from any substances in Atlanta, without the consent of the city, but must leave the streets in good condition after opening them. (Gate City Gas Light Company *vs.* City of Atlanta, 71 Ga., 106.)

C 8. What were the limitations specified in the original charter, especially as regards (*a*) area to be served, (*b*) stock to be issued, (*c*) bonds to be issued, (*d*) dividends to be paid, (*e*) prices to be charged, (*f*) candle power of gas, (*g*) purity of gas, (*h*) pressure, (*i*) audit of accounts, (*j*) taxation, (*k*) compensation for franchises, (*l*) publication of reports, (*m*) making reports to governmental authorities, (*n*) other important matters?

Norfolk. Area is the "City of Norfolk." Capital stock not less than $20,000 nor more than $100,000. No mention whatever is found in the charter of any of the matters under C 8, *c* to *n*, inclusive. The company was permitted to make gas from bituminous coal or other substances for public or private illumination.

Atlanta. The area was "The City of Atlanta." The other matters referred to under this question, *b* to *n* inclusive, are not mentioned in the charter. The property was naturally subject to the general taxing power of the Legislature; no franchise tax was levied until Act of 1902. In general the charter was the broadest possible, and subject only to the inherent governmental powers of the State.

C 9. If any changes have been made in the original charter as regards powers and limitations of the company, state when, how, to what extent, and for what reasons.

Norfolk. By the amended charter January 18, 1884, the company was authorized to build and operate works and distribute gas and electricity "both within the corporate limits of Norfolk city, and without the same in Norfolk County adjacent to said city." Real estate holdings limited to 20 acres. The company subject to chapters 56 and 57, Code of Virginia (ed. of 1873). Capital stock raised to $500,000. Company to repair streets opened by it. Gas pipes laid without the consent of the city, but no poles set without the consent of the Council.

Amended charter of January 31, 1890, Section 1, gives the company the right to manufacture and sell "gas and electricity or other thing from bituminous coal or other substances or materials for the purpose of public and private heating, illumination, or for power"; the right to extend the service to the whole county of Norfolk, subject to chapters 46 and 47, Code of Virginia (ed. of 1887). Section 2 authorized the company to borrow upon mortgage, at not above 6 per cent., an amount not to exceed half of the paid-in capital. The provision on pipes and wires, the same as in the previous charter.

The Corporation Court charter of the Norfolk Gas and Electric Company, June 2, 1896, authorized the construction, lease, purchase, or acquisition by consolidation with any other company or companies, and the operation and maintenance in the City or County of Norfolk, or both, all works for gas and electricity for heating, light and power, and for any other purpose for which the same may be used, from coal or other substances. Section 1 makes the company subject to the restrictions now imposed, or that may be imposed in the future by the Legislature, "and it (the company) shall have power to do such acts and things and conduct such enterprises as are convenient in connection with, or incidental to, the enjoyment of the powers herein conferred, and may, with the consent of the Councils of the City of Norfolk, use the streets of said city for laying its pipes and erecting its poles." By Section 3 the company may issue stock above or below par, and may exchange the stock for labor, materials, stocks or bonds with individuals or corporations at the discretion of the directors. Section 6 gives the company unlimited borrowing power, without limitation of the rate of interest, with the right to mortgage all of its property, rights, and franchises. Section 10 gives an unlimited right of consolidation under any name and with any companies now chartered or to be chartered for "purposes the same as or similar to those for which this company is chartered." Upon consolidation, the company is given specific right to receive the stock or bonds of other companies, and to sell or hold them at pleasure.

On June 15, 1896, the charter of the City Gas Light Company was amended by the Corporation Court of Norfolk to permit the increase of capital stock to $500,000. This authorized loans to the amount of the maximum capital stock; the rate and price, left to the discretion of the company. The company is permitted by the unanimous vote of the stockholders to sell, lease, merge, or consolidate its property, rights, etc., with those of any other corporation chartered or to be chartered for the same or similar purposes under any name it may choose; to receive stock or bonds of a consolidated company in payment. The consolidation is to be complete as soon as the agreement of consolidation is lodged with the Secretary of State for record.

Atlanta. By amendment of October 14, 1889, the powers of the company are enlarged to authorize the company to make, sell, and furnish gas and electricity for any and all purposes, and to establish and maintain the necessary pipes and apparatus. Especially was the company authorized to issue bonds (no limit as to amount, rate, or price), and to secure the same by mortgage on the rights, property and franchises of the company. Bond issues require the vote of stockholders.

C 10. What fees were required at time of incorporation?

None for either company.

C 14. *Was any payment made during the past year to local or State governments for privilege of incorporation?*

Norfolk. The total payments by the company to the public authorities were:

State property tax	$602.00
State franchise tax	125.00
City license tax for distributing gas	800.50
City license tax for handling supplies, gas stoves, etc.	105.55
City property tax	7,054.00
Atlanta. Local plumbing license	50.00
Local gas license	30.00
Local license for handling gas stoves, etc.	25.00

Under the Act of 1902 the company paid $2,227.50 annual tax, at the same rate as property tax, on the value of the franchises, as assessed by the Comptroller General of the State.

The value of the franchise for 1903, as fixed by arbitration, was $137,500; for 1905, $255,000. The County and State each levies its property tax on the value of the property and also on the value of the franchises.

C 15. *What State authorities have power to supervise, control, or regulate the operations of the company?*

Norfolk. The State Corporation Commission has power to enforce the laws, but the company considers itself exempt from supervision in its operations, on the theory that its charter is a contract.

Atlanta. None.

C 16. *Give references to statutes providing for such supervision.*

Norfolk. State Constitution (1902), Arts. 12 and 13, deal with corporations; Act of April 15, 1903; Act of January 18, 1904.

Atlanta. None.

C 17. *Give references to the general State laws which relate to gas works and gas companies.*

Norfolk. Acts of May 15, 1903, relating to foreign corporations; May 21, 1903; January 18, 1904, Ch. 9.

Atlanta. None, except that by Section 700, Code of Georgia (1895), towns are given the right to erect, or authorize or prohibit the erection of gas and water companies therein. But this section does not apply to incorporated cities.

C 18. *Give references to the special laws relating to these gas companies.*

Norfolk. Acts of January 13, 1850, January 18, 1854, January 31, 1850. All these are the acts granting or amending the charter of the company. The charter has likewise been amended by the court decrees of the Corporation Court of Norfolk of June 9, 1896, and June 15, 1896, and by the consolidation agreement of June 17, 1896.

Atlanta. No legislation except the two company charter acts of February 16, 1856, and October 14, 1889.

C 16. Give statutory provisions regarding size and location of plant.

Norfolk. The plant may be located anywhere in the county, but real estate holdings are limited to 20 acres.

Atlanta. No provisions.

C 17. Give statutory provisions regarding area to be served.

Norfolk. City and County of Norfolk.

Atlanta. "The City of Atlanta."

C 18. Give statutory provisions regarding nature of plant or equipment.

In neither case is there any provision regarding the nature of plant or equipment.

C 19. Give statutory provisions regarding extension of mains.

Norfolk. No statutory provisions; but the ordinance of May 29, 1902, requires any company having the right to use the streets of Norfolk to obtain a permit before opening the streets. The company, as an act of courtesy, conforms to this ordinance, but denies its legal validity. The Act of January 18, 1904, prescribes certain police regulations as to the depth and location of pipes.

By Section 1033d, Code of Virginia, 1904 (Acts of the special session of 1902-'3-'4, p. 412), no person, company, or corporation engaged in the manufacture and sale of gas, water, electricity, etc., and "like enterprises" shall be permitted to use the streets, public ways, etc., of any city or town without the previous consent of the local authorities.

Atlanta. No provisions.

C 20. Give statutory provisions regarding improvements and new processes.

Not mentioned for either company.

C 21. Give statutory provisions regarding price of service, arrangement of charges, discounts, deposits, etc.

Norfolk. No statutory provisions or ordinances. The company is held in check by fear of competing companies. The new constitution (1902), Section 156 (*f*) describes the powers of the Corporation Commission, and authorizes it to prescribe rates, charges, and classification of traffic for transportation and transmission companies, removing this class of corporations in this particular from the control of the Legislature, and it gives the commission a like power in regard to other public service corporations, subject to general legislation by the general assembly; "provided, however, that nothing in this section shall impair the right which has heretofore been, or may hereafter be conferred by law upon the authorities of any city, town, or county, to prescribe rules, regulations or rates of charge to be observed by any public service corporation in connection with any service performed by it under a municipal or county franchise granted by any such city, town or county, so far as such services may be wholly within the limits of the city, town, or county granting the franchise."

Atlanta. Not mentioned.

C 22. Give statutory provisions regarding character and quality of service.

Norfolk. No general or special legislation on this matter, which is not mentioned in the company's charter.

Atlanta. No provisions.

C 23. Give statutory provisions regarding the issuance of stock.

Norfolk. From $25,000 to $500,000. The price and conditions of sale are left absolutely to the discretion of the company. It is a question how far the drastic restrictions on the issuing of stock prescribed in Art. XII, Sec. 167, of the Constitution of 1902, and the legislation since passed for enforcing these provisions, apply to this company, whose special charter ante-dates this Constitution.

Atlanta. The matter is not mentioned in the statutes. The company issues under the inherent right of corporations to issue stock.

C 24. Give statutory provisions regarding the issuance of bonds.

Norfolk. The company has unlimited borrowing power on terms to be determined by the company alone. The rate and conditions are determined by the stockholders. The answer to C 23, above, applies to this question.

Atlanta. Bond issues require a vote of the stockholders. No other limitations. (Act of October 14, 1889.)

C 25. Give statutory provisions regarding depreciation.

C 26. Give statutory provisions regarding amount and use of profits.

C 27. Give statutory provisions regarding dividends to be paid.

There are no provisions relating to any of these matters for either company.

C 28. Give statutory provisions regarding compensation for franchises.

Norfolk. The City of Norfolk, under its special charter, has the right to license almost any trade or occupation, and to fix the amount of the license fee annually by ordinance. Annual license fee at present $800. (Ch. 87, Special Ordinances of Norfolk, Norfolk City Code, 1902, p. 519, par. 78.)

Atlanta. No compensation. Franchise value subject to tax at the same rate as tangible property by county and State. (Act of 1902.) Such taxes are annually levied and collected.

C 29. Give statutory provisions regarding audit of accounts.

No provisions for either company.

C 30. Give statutory provisions regarding examination and inspection of records.

Norfolk. Under Sections 156 and 164 of Constitution (1902) and Act of April 15, 1903, establishing the State Corporation Commission, and the Act of January 18, 1904, entitled "An Act concerning public service corporations." Ch. 9, nearly all the constitutional power of the State over the company is delegated to the State Corporation Commission, which exercises legislative, judicial, and administrative powers. It is a question, however, how far the State through any of its organs has power over this company.

Atlanta. No provisions.

C 31. Give statutory provisions regarding publication of reports.

No provisions for either company.

C 32. Give statutory provisions regarding settlement of claims for injuries or death.

No special legislation in regard to such companies in either State.

C 33. Give statutory provisions regarding wages to day laborers.

No provisions for either company.

C 34. Give statutory provisions regarding hours of labor of day laborers.

Norfolk. No special legislation. Section 3657 B prohibits the employing of any child under 14 or any woman as an operator in any manufacturing establishment more than 10 hours in any one day, under penalty of $5 to $20. Section 3657 BB prohibits the employment of any child from 12 to 14 years of age between the hours of six at night and seven in the morning, and any child under twelve years at any time. Penalty to the employer and also to the parent or guardian of the child of $25 to $100.

Atlanta. No restrictions except for minors. The hours shall be from sunrise to sunset for minors. Contracts for longer hours void. No penalty.

C 35. Give statutory provisions regarding employers' liability.

Norfolk. No special legislation in regard to such companies.

Atlanta. None, except that under charter amendment of August 3, 1905, Section 4, the city may require any person, firm, or corporation licensed to do business under the charter to give bond payable to the city or any one else suing in the name of the city for their use for injuries and damages received on account of the immoral or improper conduct of the business so licensed. Bond to be annual, and not to exceed $5,000. Any person injured may sue on this bond, the recovery of which shall be payable to such person or persons. Georgia Code, Section 2610; the common law liability, fellow-servant doctrine, still holds in Georgia except in the case of railroad employees.

C 36. Give statutory provisions regarding strikes.

C 37. Give statutory provisions regarding citizenship of employees.

C 38. Give statutory provisions regarding conditions under which employees labor.

No provisions on any of these matters which apply to either one of these companies.

C 39. Give statutory provisions regarding other important matters.

Norfolk. The Act of May 21, 1903 (Sections 14 and 39), entitled "An act concerning corporations," requires a report to a court of record where the company is located of the names of the officers and directors elected, and the payment of a fee of 25 cents for recording the report. If all of the officers and directors are non-residents (of the town or city), the company must appoint an attorney on whom processes may be served, under penalty. Section 39 requires a report to the State Corporation Commission after each election, setting forth the name, location, character of business, capital authorized and issued, names and addresses of officers and directors, their respective terms, and the date for the next meeting of the corporation. Penalty of $100. Section 3657 (c) of the Code prohibits, under penalty of from $100 to $500, an employer from preventing or attempting to prevent a discharged employee from procuring employment. This is not to be construed, however, to prevent the employer on application from giving a "truthful statement of the reason for such discharge."

Atlanta. By Section 1873 of the Code a corporation is prohibited under penal damage from black-listing a discharged employee. The section does not, however, prohibit such corporation from giving to anyone of whom the discharged employee seeks employment the true reason for discharging the employee. Upon demand, however, of the discharged employee, such corporation must within 10 days furnish him with a true copy of the statement.

C 40. What means have been provided for the enforcement of the above provisions (C 16-39)?

Norfolk. The provisions are very meager and indefinite. The constant fear of competing companies, however, seems to have held the company pretty well in check. So far as can be ascertained, there is but little public feeling against the company, or in favor of more stringent control. The laws referred to under C 39 above, if applicable at all to the special charter, which applicability the company denies, relate to the internal organization and management of the company, and not to its operation or relation to those served.

Atlanta. None.

C 41. Are they adequate or inadequate? Under present conditions both these companies seem to get along reasonably well.

C 42. Describe defects in remedies and penalties.

Norfolk. This question must be answered on general theoretical grounds. The answer, therefore, must turn on the particular views of the person answering, as to what ought to be the relation of public service corporations to the public. I have found no evidence of grossly unfair or indecent dealings on the part of the local company towards the public. I believe, however, that uniform accounting and public audit for all such companies would be helpful. All the legislation looking toward the control of such companies dates from the new Constitution of 1902, and is so entirely new that it is wholly undetermined judicially what it means. Meantime, both the public authorities and the company seem to be proceeding with great caution.

Atlanta. There being no statutory requirements, remedies and penalties for violation do not exist.

C 43. If any other state board, commission, or other authority has control or supervision over gas companies, give statutory provisions relating to its powers and functions.

Norfolk. So far as the State has control over this company, that control is lodged in the State Corporation Commission referred to in the answer to C 30.

Atlanta. This company is virtually subject to no control of any sort save under the very vague powers inherent in the Legislature; that is, the general police power and the power of taxation.

C 44. If judicial or administrative orders have been issued by State authorities relative to gas companies, state them, and give source and date of issue.

C 45. What have been the effects of this supervision?

No such orders in either case; therefore, no effects of supervision.

C 46. What powers of supervision over the construction and operation of the plants of private companies does the city possess?

Norfolk. None, except that under the Constitution of 1902 the city requires the company to take out permits for opening the streets; also, by ordinance of May 8, 1900 (Ch. 71, Sec. 633). The City Gas Company seems to be entirely independent of the city. Out of courtesy to the city, as the company alleges, it accepts permits from the administrative officers of the city to open the streets (see answer to C 19), but refuses to go to the city council for such permits. The city seems to have no special supervision over the company by constitution, statute or ordinance, but exercises the general police power inherent in the city. Under the Constitution of 1902, Art. 8, Sec. 124, no company can be admitted to the city without the consent of the city; and under Section 125 no franchise can be granted for more than 30 years. All the general laws bearing on the matter are so new that they have never been judicially interpreted. Consequently, their meaning is very uncertain. The Act of January 18, 1904, Ch. 10, Sec. 1294 I, requiring the consent of the city by ordinance, declares that "such use of the public roads, highways, streets, avenues and alleys in any of the cities of this State shall be subject to such terms, regulations and restrictions as may be imposed by the corporate authorities of such city." The city is prohibited from granting the use of its streets to any company until the company has obtained a license from this State, "and providing also that, notwithstanding the provisions of this chapter, the corporate authorities of any city or town may impose upon any such corporation such terms and conditions inconsistent therewith or supplemental thereto as to the occupation and use of its parks, streets, avenues, and alleys, and as to the construction and maintenance of its works along, over or under the same, as the said corporate authorities may deem expedient and proper."

It is clear that this legislation gives the widest possible powers to the city in imposing all sorts of conditions on companies which it admits under these acts, including money payment on almost any agreed basis. On this power of the city to fix terms and require payment for franchises see the decision of the County Court of Norfolk County, November 12, 1906, in The City of Norfolk vs. The Norfolk Atlantic and Terminal Company. The gas company claims to be exempt from all this new legislation.

Atlanta. By city ordinance of May, 1880 (ordinances, Sec. 1229), any person desiring a permit to open an improved street shall obtain permission from the Commissioner of Public Works, and deposit with the said Commissioner of Public Works a sum sufficient, in the judgment of the Commissioner, to put the street in good condition. By Sec. 1277 (May 7, 1888), gas mains are required to be laid three feet below the surface of the street. It was decided in The Gate City Gas Co. vs. City of Atlanta, 71 Ga., 106, that the Atlanta Gas Light Company does not require the consent of the city to open the streets, having obtained that right from the Legislature in its charter. As a matter of courtesy and policy, however, the company takes out permits.

C 47. What provision has the city made for the exercise of its powers of supervision?

Norfolk. None, except by ordinance of May 8, 1890, the Board of Street, Sewer and Drain Commissioners grants permits to open the streets and directs "how and in what manner the said openings shall be made." (The City Code 1902, p. 278.) The inspector of streets may give notice to the company to close the openings. The inspector is responsible for having all openings closed. Fine of $10 per day for refusing to close streets after notice. If the company relays the street imperfectly, it must do the work over, on notice of the inspector, within four days. Penalty for neglect, $5 per day. The Board of Street, Sewer and Drain Commissioners has the right to put the streets in order after they are opened, at the expense of the company, if the company refuses or neglects to do so. The inspector of streets is subject to this board, whose duty it is to see that this ordinance (May 29, 1902) is enforced, and to report violations of the same to the Council. The company claims that so far as it is concerned this ordinance is void, except that portion of it which merely confirms the inherent police powers of the city. The Board of Street, Sewer and Drain Commissioners requires from those seeking street openings a deposit sufficient to restore the pavement to its previous condition.

Atlanta. See answer to C 46.

C 48. How frequently and with what efficiency does the City exercise its powers of supervision?

The city, having no powers in either case, cannot exercise control.

C 49. Has the company resisted the enforcement of the legal provisions regulating and providing for public supervision?

C 50. If so, has the position of the company been upheld by the courts?

C 51. What provisions have been found impossible of enforcement, and why?

The city in neither case has sufficient power to raise a conflict.

C 52. What taxes are paid to State authorities?

(*a*) Basis of levy.
(*b*) Method of assessment.
(*c*) Principles of valuation.
(*d*) Rate of taxation.
(*e*) Method of collection.
(*f*) Disposition of receipts.
(*g*) Other important matters.

Norfolk. The company pays to the State a general property tax, an annual registration tax, and an annual license tax. The property is valued under the law by local assessors at its fair market value, and upon this the Legislature fixes the rate of tax for each year. The rate was recently reduced from 40 cents to 35 cents. Under Section 41 of an Act of May 16, 1903, the Corporation Commission assesses an annual registration fee on corporations, graded according to the authorized capitalization, and ranging from $5 to $25. The gas company pays the maximum, as it has a share capital in excess of $300,000. Under Section 3 of the same act as amended in 1904 (Laws of 1904, p. 263), the Corporation Commission assesses also an annual franchise tax varying from $10 for a capital of $25,000, to $200 for an authorized capital in excess of $1,000,000, with an additional tax of $10 for each $100,000 or fraction thereof in excess of a million. This tax on this company is $100 a year. By amendment of March 17, 1906, a failure to pay this tax for two successive years, or to make the annual report to the State Corporation Commission which furnishes the information on which the tax is laid, if such failure continue for 90 days after the expiration of the two years, works without further action on the part of the State, revocation of the company's charter if it be a domestic company, and its license to do business in the State if it be a foreign corporation. The State Corporation Commission must publish the fact of such revocation once a week for four successive weeks in a daily newspaper published in Richmond, Va. By the tax law (Code of 1904, p. 2217, Sec. 47), a failure to make said report for 30 days subjects the company to a fine not to exceed $100 for each offense and for each period of 30 days, the fine to be laid by the State Corporation Commission after failure by the company on 30 days notice to appear and show cause why it should not be fined. The right of appeal to the Supreme Court is given to the company.

Under the general revenue law (Code of 1904, Ch. 23, Sec. 167), two assessors appointed by the Corporation (City) Court, with five-year terms, value the real estate once in five years (City Charter, 1894, Sec. 36). The Commissioner of Revenue is elected once in four years. He makes an annual assessment or valuation of all the personal property at its fair market value. The method of assessing the registration and franchise taxes is determined by statute; they being fixed by the Corporation Commission, and certified to the State Auditor, and paid into the State Treasury. The registration and franchise taxes are fixed by statute, and graded in amount on an arbitrary scale, based on the amount of authorized capital stock. The real estate and personal property are, under the statutes, to be valued at their fair cash value in accordance with the theory of the general property tax. Appeal from the assessors (Code of 1904, Sec. 444) goes direct to the Corporation Court to correct assessments on real estate. Personal property assessments are, in case of a difference of opinion between the taxpayer and the commissioner, settled by a joint board of arbitration selected for each case. The annual registration fee of the company is $25; annual franchise tax, $100; State property tax, 35 cents on the hundred dollars.

The franchise and registration taxes are paid directly to the State Treasury. Property tax is paid to the City Collector, who turns it over to the City Treasurer, who in turn sends it to the State Treasurer with a report thereon. The collection begins on the first day of July. The City Collector reports on his collections to the State Auditor December 1st, and makes his final report on June 15th. The funds belong to the general funds of the State.

Atlanta. The company pays to the State an annual license tax; a general property tax at a rate fixed biennially by the Legislature (for 1906–7, 3.05 mills), an educational tax of 1.70 mills; the value of the franchise being added to the value of the tangible property for purposes of taxation, and the common rate laid on the combined value.

The assessment of all companies enjoying franchises, under the Act of August 17, 1905, is made by the Comptroller General of the State on the basis of a sworn return made by the company. The constitution and statutes require the tangible property to be assessed at its fair market value, the value of the franchise being added to the value of the property. Said values are to be fixed at the discretion of the Comptroller General on the basis of returns made by the company, subject to an appeal to a joint board of arbitration at the will of the company. The value of the franchise for 1903 was fixed by arbitration at $147,500, and for 1905 at $225,000. The license tax, annual, is fixed biennially by statute, according to the amount of capital stock. For this company (Act of 1905), with a capital stock of $1,614,625, this tax is $100.

The combined State rate of taxation for general purposes and education is 4.78 mills.

State franchise tax is paid to the State Comptroller General. The property tax is paid to the Tax Collector for the County and State. The State's portion of the funds is turned into the State Treasury; the County's portion, into the County Treasury.

C 53. What taxes are paid to local authorities? Explain fully.

(*a*) Basis of levy.
(*b*) Method of assessment.
(*c*) Principles of valuation.
(*d*) Rate of taxation.
(*e*) Method of collection.
(*f*) Disposition of receipts.
(*g*) Other important matters.

Norfolk. The general city property tax and the annual license fee. Under the city charter (1884) the city has virtually an unlimited power of levying by ordinance an annual license tax on anything it chooses. Under the tax ordinance of April 24, 1905 (Section 87), a license of $800 was levied on the gas company for supplying gas, and a license fee for subsidiary industries (gas stoves, gas fitting, etc.) of $105.55.

The licenses are fixed annually by ordinance. But one assessment of real estate and personal property is made for both State and city purposes. The amount of the licenses is at the discretion of the Council. The valuation of property is the same as for State purposes, and by the same officials.

The city rate of tax for 1905 is $1.70 per $100 (Sections 3 and 4 of ordinance). All the moneys are paid to the City Collector, and by him turned over to the City Treasurer. Under the various amendments to the charter, and the annexations to the city, all of the tax collected on property taxable in the Seventh Ward shall be appropriated and expended in said ward. From the taxes collected in the other six wards, there shall be set aside 5 cents per $100 of assessed value for repairing sidewalk in said wards, and likewise 5 cents for a sinking fund to retire demand notes issued for building school houses in said wards. The remainder of the tax goes for general city purposes. The county has the statutory right to levy taxes, but at present does not do so.

Atlanta. The company pays since 1896 annually at the rate of $1.25 per $100 on the combined value of the property and franchises; also a license tax for gas, $50; for gas stoves, $25; for plumbing, $50, and a sanitary tax of $1 on each improved lot. The sanitary tax for several years has amounted in all to $42 yearly. The County levies annually a tax of about 50 cents per $100 on the value of the property and franchises of the company. The company makes a sworn return annually to the Comptroller General. This is subject to review by him, and, at the will of the company, subject to arbitration for determining the value of the franchises for purposes of local and State taxation. The assessment of tangible property for purposes of city taxation is made by three local assessors elected by the council, with two-year terms. They are required to assess the property—real and personal—at its fair market value (Section 76, amended charter, 1896). From this assessment appeal may be made direct to the court without any intervening effort to correct errors or equalize the tax. The assessment also is made on the basis of sworn returns by the owners, with a wide discretion on the part of the assessors. The returns made by corporations with franchises to the State are entirely distinct from those made by the same persons to the city on the same property, and although the statute requires the actual value to be given in each case and sworn to, it is supposed that on the average the values returned to the city assessors are from 60 to 75 per cent. of the actual value, while it is generally understood that the State will accept a value equal to three-fourths of that returned to the local assessors. The State uses the County assessment on all other property. In theory the principal of valuation is the fair cash value of the property and franchises. The city income is fixed annually by ordinance, within the $2.00 limit fixed by statute (City Charter, Ch. 2, Sec. 63). The annual city rate had been for many years before 1896, $1.50 per $100. It was reduced by amendment to the City Charter December 23, 1896, to $1.25. It is provided that the Mayor and Councils in case of a real emergency, of which they are to be the judges, may add to this a rate of ¼ of 1 per cent. (City Charter, Ch. 2, Sec. 63). The County levies at present a tax of 50 cents on the $100.

The city taxes are paid at the City Hall to the City Collector, who is elected by the people (Charter, Ch. 12, Sec. 155), with all other taxes, and in three installments, on April 15, July 1, and October 15 of each year. Under the Act of 1896, the city has by ordinance authorized a discount of ½ of 1 per cent. for paying the total tax when the first installment is due, and of ¼ of 1 per cent. for paying all of the remainder when the second installment is due. Unpaid and overdue installments bear interest at 7 per cent. The first two installments are each of 25 per cent. of the total tax; the last, 50 per cent.

The receipts from taxes are subject to the general appropriation power of the city, except the sanitary tax of $1 on each improved lot, which is raised for the purpose of removing garbage (Ordinances, Section 1434). The County taxes are paid to the County Collector and turned over to the County Treasurer for the general uses of the County. See explanation of the court decree of October 7, 1895, D 47.

C 54. If gas companies are taxed differently from other corporations and other property, state how and to what extent.

C 55. What fees or licenses are paid to the State or local authorities?

Norfolk. Such companies are not taxed differently except the license tax and franchise tax, and these are the same as for other corporations (Constitution, 1902, Art. 9, Sec. 128): "In cities and towns the assessment of real estate and personal property for the purpose of municipal taxation shall be the same as the assessment thereof for State taxation whenever there shall be a State assessment of such property. All public service corporations shall be taxed in the same manner."

This company pays an annual license tax of $800 to the City, as a gas company; a license tax on appliances handled of $105.55; and a State franchise and registration tax of $125.

Atlanta. Not all corporations, but all corporations enjoying local franchises are subject, not only to a franchise tax, but under the Act of August 17, 1903, are assessed for franchise tax, State and local, by the Comptroller General of the State. It is especially provided that such companies shall not be twice taxed for the same franchise privilege, by requiring that the local authorities upon receiving their respective shares of the franchise tax collected by the State, shall give credit to that amount on any payments made by the same companies from gross receipts or otherwise for their franchises under agreements with the local authorities. Under the present laws the city has very wide power to contract with persons or corporations (Chapter 1, Section 1, Code of Atlanta). This extends to the right of demanding cash payments from the companies for the use of the streets. For instance, the street railway company, in addition to heavy bridge rentals, pays 2 per cent. of its gross receipts. A new thirty-year electric franchise went into effect January 1, 1906. Under this the city is to receive, for the first twenty years, 2 per cent. of the gross receipts, and for the remaining ten years, 3 per cent. The company specifically agrees to remove all of its property situated on, over or under the public ways and grounds *before* the end of the concession. In consideration of these payments, the company is exempt from specific registration fees and business licenses; but pays the regular rates for opening streets and repairing the same, sanitary tax, water charges, and the like, and furnishes one free duct for the use of the City in every conduit. The company is also liable for all special assessments for street improvements.

The amount of taxes and license fees is stated in answer to C 52 and 53.

C 56. Is the company subject to assessment for local improvements?

Norfolk. Under the constitution (Art. 13, Sec. 170) cities may levy special assessments according to benefits for "making and improving all walk-ways upon then-existing streets, and improving and paving then existing alleys, and for either the construction or use of sewers. The City of Norfolk does not avail itself of this privilege.

Atlanta. Yes, by Sections 139 and 140 of the amended charter of 1896.

C 57. Are such assessments actually levied?

Norfolk. No.

Atlanta. Yes, as occasion requires.

D—FRANCHISES OF PRIVATE COMPANIES

D 1. Does the municipality have power to grant franchises to gas companies?

D 2. How was the power conferred, by

(*a*) General law applicable to all cities in the State? or

(*b*) General law applicable to all cities in a class? or

(*c*) Special act applicable to this city alone? or

(*d*) Administrative order? or

(*e*) Other methods?

Wheeling. The city has power to grant franchises to gas companies under its special charter. If it did not have such power under the special charter, it could still grant franchises under the general laws applicable to all cities, the two sets of laws not being in conflict (Laws and Ordinances of Wheeling (ed. 1901), p. 10, Section 29; p. 14, Section 42; p. 18, Section 3; 47 West Va., 739).

Norfolk. The city may grant franchises. The Constitution of 1902 places the cities with special charters especially under the new constitution. Section 150 (1) of the constitution especially reserves the rights of the cities in this connection. The act concerning public service corporations (January 18, 1904), Ch. 3, Sec. 1, forbids any public service corporation to do business in any incorporated city or town without the consent of the city; while Chapter 9 of the same act, Section 165, in all embracing language authorizes the city to grant such franchises, to supervise and control their operation, and to fix terms, regulations and restrictions therefor.

Atlanta. In as much as the subject is not mentioned in the constitution, statutes, or charter, the granting of gas franchises is considered an inherent right of cities. Under the general welfare clause (Ch. 1, Sec. 1, Code of Atlanta), the citizens of Atlanta are incorporated "with power to govern themselves by such ordinances, resolutions and by-laws for municipal purposes as they may deem proper, not in conflict with the charter and the Constitution and laws of the State or of the United States." (Charter amendment, October 28, 1874.) This clause, as I understand it, is given almost if not entirely as wide an interpretation as Section 13 of the earlier charter of December 29, 1847, which in express terms gave the Mayor and Council special power to make all contracts in their corporate capacity deemed necessary for the welfare of the city.

D 3. State fully, step by step, the procedure which must be followed and the requirements which must be met in the initiation, consideration, enactment and renewal of franchises; also source of each provision, whether statute, city charter, or ordinance.

Wheeling. Answered under B 8.

Norfolk. The Constitution (1902) forbids the Legislature to permit any company to use the streets, alleys or public grounds without the previous consent of the city or town; and by statute (Section 1294 I. Code of 1904) the city is prohibited from admitting any company until that company has a franchise or license from the State to do business in that State. Article 125 limits all franchises to thirty years. An ordinance of March 13, 1900, requires that every proposed franchise shall be printed at the expense of the petitioners, and a copy presented to each member of the Council before it shall be considered as having been presented to the Council (City Code, 1902, p. 137). The ordinance must pass each branch by a majority of all the members elected to each branch. The vote in each Council is by yea and nay. No such vote may be reconsidered or rescinded at a special meeting unless as many are present as when the original vote was taken. No ordinance granting a franchise is to be introduced except at a regular meeting, nor be passed until the next regular meeting of the Council in which it was introduced (City special charter, April 21, 1882, Ch. 3, Par. 18). By the constitution (1902), Section 163, no foreign public service corporation, without first becoming incorporated in Virginia, shall "be authorized to acquire, lease, use or operate within this State any public or municipal franchise or franchises in addition to such as it may own, lease, use or operate when this constitution goes into effect." The same clause authorizes the Legislature "to discriminate against foreign corporations whenever, and in whatever respect it may deem wise or expedient." Section 164 declares that the State's right to regulate, control, fix, limit their charges (that is, of public service corporations) shall never be surrendered nor abridged." The Constitution further provides that "before granting any such franchise or privilege for a term of years, except for a trunk line railway, the municipality shall first, after due advertisement, receive bids therefor publicly in such manner as may be provided by law." Such grant may provide that at the end of the franchise all the property of the grantee in the public property shall go to the city without compensation, or upon fair valuation. Payment for franchise value is forbidden.

Atlanta. The charter of Atlanta (Ch. 3, Sec. 31) requires that in granting franchises the Aldermen shall sit as a separate body to pass on the franchise by vote. In ordinary matters they are members of the Council, and do not sit as a separate body, sitting thus only in matters specifically provided for in the charter.

By a charter amendment (Act of 1909), the vote does not require a majority of all members elected to the two Councils, but a majority of a quorum only. One member of the General Council may call for the yeas and nays. A majority makes a quorum in the two Councils when they sit separately; eight, a quorum of the General Council. By Section 38 of the charter, all ordinances shall require at least two readings at different meetings, except that by a two-third vote of the members present an ordinance may be read twice at the same meeting and adopted. This applies to ordinances requiring the Aldermen and Councilmen to sit as separate bodies. "An ordinance requiring separate action and concurrence by the Board of Aldermen shall undergo such readings only in said Board of Aldermen as said Board may by rule prescribe."

An ordinance of March 4, 1901, approved March 7, 1901, amendment thereto, September 5, 1901, approved September 9, 1901, requires the applicant for a franchise to advertise his proposal in detail at least five separate days in the daily newspaper in which the city advertisements are inserted before presenting the same to the Mayor and Council. This ordinance in terms applies to liquor licenses, street and steam railways, telephone and telegraph franchises. The same principle would doubtless be applied to any franchise—certainly one as important as a gas franchise. An ordinance of March 4, 1901, approved March 7, 1901, declares that no franchise ordinance shall be considered or passed or granted in any way or to any extent at the same meeting of the General Council at which the same was introduced. The ordinance is to be referred to a committee if desired, but not passed before the next regular meeting after application. Motions to read the second time and to pass at the same meeting at which the ordinance is first introduced are to be out of order. Section 2 requires the Clerk to furnish each member of the General Council within five days after its introduction with a copy of such proposed ordinance.

The method of advertising may be shown by the following example:

"*Petition for Privilege.*

"To the Mayor and the General Council of the City of Atlanta: The Atlanta Telephone and Telegraph Company asks the privilege of opening from time to time, as its interests may require, the thoroughfares, streets, lanes and alleys of the City of Atlanta, and to be allowed to build therein conduits, manholes and service ducts, and to connect the same with buildings and private lots fronting on the streets where such conduits, manholes and service ducts may be allowed, with pipes and ducts, so as to be able to install cables and wires in such conduits, and to connect the same with private property fronting on said streets.

"Respectfully yours,
"ATLANTA TELEPHONE AND TELEGRAPH CO.,
"C. J. SIMMONS, Pres."

[From Fulton County Report, March 6, 1909, official organ of Atlanta.]

D 4. Give legal provisions with source of each defining the powers of the city regarding the alienation of municipal franchises.

Wheeling. Since the Act of March 11, 1836, Section 28, all the powers of the municipality are lodged in the Council, except as otherwise expressly provided in the charter. (See Section 3 of the same act.) Under these powers the Council may grant or renew franchises in a manner explained in answer to B 8. See also answer to B 32.

Norfolk. The matter probably comes under Section 125 of the Constitution in regard to disposing of property. This can be done by ordinance passed by a three-fourths vote in each Council, "and under such other restrictions as may be imposed by law." I find no other statutory restrictions. If the Mayor vetoes the ordinance of sale, it requires a three-fourths vote of all the members elected to each Council to overcome the veto. For the city to lease such franchises, it is required that the lease be sold at auction. Such lease may provide the conditions on which the property of the grantee situated on the public grounds and streets shall go to the grantor at the end of the lease. There is an express prohibition against paying the grantee any value for the franchise. After such lease the city may sell or re-lease, or "if authorized by law," may maintain, control and operate. Every grant of the kind must specify the mode of determining any valuation therein provided for, and "shall make adequate provision * * * to secure efficiency of public service at reasonable rates." The General Assembly is especially authorized to make additional restrictions on cities "in granting franchises, or in selling or in leasing any of their property." The restrictions on franchises heretofore existing are specifically reserved.

Atlanta. No specific provisions. By implication the answers to D 2 and 3, and D 5 and 6 apply to this question. Street railways subject to different provisions.

D 5. Give legal provisions with source of each defining the powers of the city regarding methods of disposing of franchises.

Wheeling. Answered under D 4.

Norfolk. Answered under D 3 and 4.

Atlanta. ———

D 6. What are the legal provisions, with source of each, delimiting the powers of the city as to the insertion of clauses in franchises regarding streets to be utilized by company?

Wheeling. Matters referred to in this question remain for the most part undetermined by judicial ruling. The powers of cities over franchises, being granted by implication only, have been rather liberally construed, when construed at all, by the courts. Gas franchises have been usually granted to serve the whole territory of the locality granting them. The courts would certainly uphold any franchise provision which did not seem plainly contrary to public policy, or in direct violation of the constitution and the laws. Such a provision in regard to streets to be occupied would certainly be upheld. Exclusive franchises, however, are not permitted except by specific legislative authority, and such authority is not given in the charter of Wheeling. (Clarksburg Electric Light Co. vs. City of Clarksburg, 47 W. Va., 739; also Gas Co. vs. Parkersburg, 30 W. Va., 435.) As late as 1887 the Supreme Court said in The Gas Co. vs. Parkersburg, "We are not referred to any statute or charter of any town or city in the Commonwealth of Virginia which confers authority upon such town or city to grant to anyone an exclusive *right* to use its streets for laying pipes, or lighting the same with gas or otherwise, and we presume there are none such." The power given the city over the streets, by implication means that no company can come into Wheeling without the consent of the city government, and that in giving such consent the city may subject the company not only to the ordinary police power and other reasonable restrictions and regulations, but also, in the absence of express prohibitions, may enter into a franchise contract with the company covering all such matters as do not detract from or barter away the governmental powers of the city, or are not distinctly against public policy. By Section 2715 of the Revised Statutes (1906) no company shall occupy the streets of the inhabited part of any *city*, etc., without the consent of the corporate authorities, unless such consent be dispensed with by special provision of law.

Norfolk. Under the Constitution of 1902 (Art. 5, Sec. 124), a company cannot enter a city without a Virginia charter or license and the consent of the city. The act concerning public service corporations (January 18, 1904) requires the consent to be by ordinance, and authorizes the city to fix terms and conditions therefor. Code, Ch. 9, Sec. 1294 I.

Atlanta. The Atlanta Gas Light Company, by its charter, which virtually ignores the rights of the city, is considered exempt from the necessity of making any contracts with the city in regard to matters referred to in D 1 to 32, inclusive. The city has no rights over the company in any way on any matters referred to therein, but in the case of any public service corporation whose charter does not give it the rights referred to in these questions, the city, under its general powers, can deal with them as it sees fit; and in the case of the electric light companies and the street railways in very recent instances, the franchises granted covered nearly all these points. See for example the franchise of the Southern Lighting and Power Company, an ordinance adopted December 18, 1905, concurred in December 19, 1905, and approved December 20, 1905, following:

FRANCHISE OF SOUTHERN LIGHTING AND POWER COMPANY

Grants to the Southern Lighting and Power Company, a corporation duly incorporated under the laws of the State of Georgia, having its principal office in the City of Atlanta, the right to enter, open and occupy all the streets, etc., and to lay the necessary pipes, wires, and apparatus for furnishing electricity for heat, light and power.

Within the fire limits they must have an underground system. The city reserves the right to have the other portions of the system put underground.

Requires applications to the Board of Electrical Control with detailed plans, and a notice to the Commissioner of Public Works, and permits from both, to open the streets.

The franchise is limited to 30 years—January 1, 1906, to January 1, 1936.

Requires that before the end of the franchise the company shall remove all of its conduits, wires, poles and other apparatus; and forbids the company entrance upon the streets or ways to make such removal after the first day of January, 1936.

Section 2 subjects the company to all existing and future ordinances regulating construction and maintenance.

Section 2 (*a*). Compensation. First 20 years, 2 per cent. of gross receipts; remaining 10 years, 1927 to 1936, 3 per cent. upon all business done or originating in Fulton County.

The city has the right to provide for or appoint a committee or board to examine the books and records of the company to ascertain the gross receipts.

The company must file a return with the city, setting forth its gross receipts before February 1 of each year. Such payments are in lieu of specific registration fees and business licenses. Provision is made for deducting the franchise tax. Charges for opening the streets and repairing the same, sanitary taxes, water charges, and the like, are to be paid the same as by any other person.

The company agrees to preserve and hold for the use of the city one duct in each and every conduit, to be used by the city for any municipal purpose entirely free of charge.

The company agrees to construct, operate and maintain arc lights, 2,000 candle power, at any point designated by the city, at an annual charge of $65 per year. Incandescent or series lights, 75 candle power, at a charge of $28 per year. This clause not to be enforceable unless the city contracts with the company to furnish the city lights where electric lights are used, for a year.

Price for Private Light and Power.

To private consumers, the company agrees to furnish current for light and heat at not exceeding 10 cents per K. W. hour; for power, not exceeding 6 cents, and to make a reduction on both of 10 per cent. if paid by the 10th of the month.

Section 4 gives the company the right to use the pipes, manholes, poles, etc., of the Atlanta Telephone and Telegraph Company now existing, or hereafter erected. Requires the approval of the City Electrician, and makes such use subject to all further ordinances of the city. Especially reserves the right to make changes, alterations and adjustments of such use at the discretion of the city. Before such joint use is made, the company must submit detailed plans to the Board of Electrical Control and receive its approval.

Special clause, requiring them to remove their poles, wires and works on the poles of the other company at the end of the franchise.

Section 5. The company must accept the ordinance within 60 days; begin work within 90 days, and build enough of its system for general operation within twelve months. Otherwise the ordinance is void.

Section 6 requires the company to give bond of $25,000 to begin work in the specified time, and to be ready to furnish service within the specified time—12 months.

Section 7 is a cast-iron clause for forfeiting this franchise in case the company disposes of any of its rights and privileges; leases without the consent of the city, or leases for purposes of consolidation; or in any way consolidates or merges with any other company, firm or individual, or combines to raise the price or to control the supply of electric current, or enters into any agreement looking to a community of interest. In any such event, all rights under the ordinance shall cease without further action by the city.

Section 7½ permits the company to acquire any water power or other property, real or personal, provided the property does not belong to any person or corporation at the time engaged in furnishing electric current for light, heat or power in the City of Atlanta.

Section 9 provides that the rights, powers, etc., described in this ordinance shall vest in and go and belong to the North Georgia Electric Company if it so amends its charter as to fix its principal office and place of doing business in the City of Atlanta, and otherwise complies with the provisions of the ordinance; and provides that within 60 days the North Georgia Electric Company may transfer its rights to the Southern Lighting and Power Company, to be organized under the laws of Georgia, should it elect to do so.

Section 10 especially provides that the franchise tax on gross income does not apply on any current originated out of Fulton and DeKalb counties, which passes through the plant in Fulton and DeKalb counties or the plant for furnishing current to Atlanta, without being transformed therein or used for furnishing current to the people of Fulton or DeKalb counties; provided such current does not pass through the streets or alleys within the corporate limits of Atlanta.

D 7, 8 and 9. Ditto regarding nature of plant and equipment, construction of extensions and adoption of improvements and new processes?

Answered under D 6 for the respective companies, except that in Norfolk the city is free to impose conditions by contract.

D. 10. Ditto regarding duration of grants?

Wheeling. By Act of February 18, 1901, franchises are specifically limited to 50 years, with the right of renewal for 50 years. Within this limitation the matter is subject to the answer under D 6.

Norfolk. The Constitution of 1902 (Section 125) limits franchises to thirty years; requires them to be sold at auction after due advertisement, and gives the right to the city to purchase at the end of the franchise, or to contract to receive without compensation. It forbids the payment for franchise value. When the city comes into possession, it may maintain, control, operate, lease or sell "if authorized by law." Every franchise may provide for forfeiture and penalties to secure efficiency at reasonable rates. This section specifically authorizes the Legislature to place additional restrictions on franchises. The act concerning public service corporations (January 18, 1904, Ch. 9, Sec. 1294 I, Code) carries out this provision of the constitution, and requires the consent of the city by ordinance, and makes the use of the streets "subject to such terms, regulations, and restrictions as may be imposed by the corporate authorities of such city or town."

Atlanta. Under its general power to make contracts, the city may insert clauses limiting the duration of franchise grants. Contracts for service are narrowly limited by the debt limitation of Article 7, Section 7, of the Constitution of 1877, Par. 1, which limits the debt of all minor divisions of the State to 7 per cent. of the assessed valuation, and forbids any new debt whatever, except temporary loans for casual deficiencies, not to exceed one-fifth of 1 per cent., unless the loan be authorized by a two-third popular vote; but any city having a debt at the adoption of the constitution not exceeding 7 per cent. may be authorized by law to increase its debt to the extent of 3 per cent. of the valuation.

This limits contracts for the supply of gas, water, etc., to a single year, unless the contract be approved by a two-thirds popular vote. The Cartersville Improvement Gas and Water Co. *vs.* The Mayor and Aldermen of Cartersville, 89 Ga., 683; and the Cartersville Water Works Co., *vs.* The Mayor and Aldermen of Cartersville, 89 Ga., 689. In these same cases it was held that while the city could not, under the constitution, exempt a company from taxation, it might by contract agree to hold the company harmless from the taxation through payment to the company of a sum equal to the taxes imposed, provided that the sum thus paid was a fair compensation for the services rendered, and not a mere device to avoid the constitutional prohibition against exemption from taxation.

D 11. Ditto regarding forfeiture of franchises?

Wheeling. Inasmuch as a franchise when accepted by a company becomes a contract, the contract may, within the limitations mentioned in the answer to D 6, contain a provision for the forfeiture, but such a forfeiture would have to be judicially determined.

Norfolk. Under the constitution and the Act of January 18, 1904, it is plain that the city may provide for forfeiture. In fact, it is required to do so; but no ordinances on this subject have yet been passed.

Atlanta. No statutory provisions.

D 12. Ditto regarding time, method and terms of acquisition of plant by city?

Wheeling. A franchise may probably provide for such acquisition on the theory set forth in the answer to D 6. Apparently, in the view of the Supreme Court of West Virginia, the right of a city to purchase, construct and operate gas works is to be implied from the general powers of the city (Gas Co. *vs.* Parkersburg, 30 W. Va., 440-441).

Norfolk. Answered under D 10. The City Gas Company, under the charter, a copy of which follows, and which contains no provisions relating to questions D 12 to 33, claims that its charter is a contract, and is not affected by the constitutions and statutes passed since 1850. The new constitution expressly reserves the right to condemn the property and franchises of corporations upon paying due compensation.

AN ACT TO INCORPORATE THE CITY GAS LIGHT COMPANY OF NORFOLK, VA.

Passed January 11, 1850.

1. Be it enacted by the General Assembly, that Tazewell Taylor, Frederick W. Southgate, A. T. M. Cooke, Thomas Newton, Richard Dickson, Cincinnatus W. Newton, Walter H. Taylor and such other persons as may be hereafter associated with them, shall be and they are hereby incorporated and made a body politic and corporate under the name and style of "The City Gas Light Company of Norfolk," with full power to construct suitable works for the manufacture, distribution and sale of gas from bituminous coal or other substances, for the purpose of public and private illumination.

And for the purpose of carrying into full effect the works herein provided for, the said company shall have power to purchase and hold such real estate, not exceeding three acres, as may be necessary for that object; and they are hereby invested with all the rights, powers and privileges conferred by an act entitled "An act prescribing general regulations for the incorporation of manufacturing companies," passed February the thirteenth, eighteen hundred and thirty-seven; and are hereby made subject to the restrictions and regulations prescribed by the same, except in so far as may be otherwise provided for in this act.

2. Be it further enacted, That the capital stock of the City Gas Light Company of Norfolk shall not be less than twenty thousand nor more than one hundred thousand dollars, to be divided into shares of one hundred dollars each, to be raised by subscription; for which purpose, if the stock be not otherwise subscribed,

books may be opened under the superintendence of Tazewell Taylor, Frederick W. Southgate, A. T. M. Cooke, Thomas Newton, Richard Dickson, C. W. Newton and Walter H. Taylor, and such other persons as may be associated with them, or any two of them, in conformity with the rules prescribed by the above recited act.

3. Be it further enacted, That each and every share of stock in the said company shall entitle the owner thereof to one vote thereon, in person or by proxy.

4. Be it further enacted, That the said company shall be authorized to open the streets, lanes, alleys and public squares in the City of Norfolk for the purpose of distributing gas; provided, that when the same shall be opened for that purpose, they shall, as soon as practicable, be repaired by the said company at their own cost and expense, subject to the approval of the inspector of said city, or the councils thereof.

5. Be it further enacted, That any person who shall wilfully open a communication into the street gas main, or other gas pipe of said company, without authority from the president and directors thereof, or who shall wilfully let on the gas after it has been stopped by order of the said president and directors for repairs or other purposes; or who shall put up any pipes or burners, in addition to the pipes or burners originally put up and inspected, or introduce gas into them without authority as aforesaid; or shall wilfully do, or cause to be done, any act or acts whatever, whereby the works of the said company, or any pipe, conduit, plug, cock, reservoir, meter, gas caps of the cock boxes, or any engine, structure, or any matter or thing appertaining to the same, shall be obstructed, injured or destroyed, the person or persons so offending shall be subject to a penalty of not less than ten nor more than twenty dollars for each and every such offense and injury, to be recovered by warrant before the Mayor or any Alderman of the City of Norfolk, one-half to be paid to the informer, and the other half to the register of said city for its own use, and shall moreover forfeit and pay to the said company double the amount of damages sustained by means of such offense or injury, to be recovered in the name of said company, with costs of suit, by action, to be brought in any court of record in this State.

6. And be it further enacted, that the Councils of the City of Norfolk shall have the power to pass ordinances for the protection from injury, by adequate penalties, not exceeding twenty dollars in any one case, of the works and property of said company.

7. This act shall be in force from its passage.

(See Ch. 216, Session Acts, 1849-'50, p. 150.)

Atlanta. Power to deal with the matters mentioned in D 12 to 31, inclusive, exists under the general power referred to in the answer to D 2 (*e*) above. The gas company, however, by its charter is exempt from all these matters, having the right to do business in Atlanta without the consent of the city. There are no specific provisions touching the matters in questions D 12 to 31, inclusive. The inherent right of the city to deal with them by contract was implied by the Superior Court of Fulton County in the case of The Atlanta Gas Light Company vs. City of Atlanta, Decree of October 7, 1891.

D 13. Ditto regarding disposition of plant thus acquired?

Wheeling. As previously explained, Wheeling has by specific grant the right to maintain and operate gas plants. If the answer to the preceding question (D 12) is correct, this matter may be made the subject of contract; provided always that the contract does not infringe upon the governmental functions of the city.

Norfolk. Answered under D 10. Constitution (Section 125) requires ordinance with three-fourths vote of each branch, under such restrictions as may be imposed by law. Veto of such ordinance requires a three-fourths vote of the members of the Councils to overcome it.

Atlanta. Section 1, paragraph 1, charter of February 28, 1874, gives the Mayor and Council absolute and unlimited power to make any and all contracts, including those of purchase, sale, lease and management of all property, real and personal, provided such contracts do not conflict with the Constitution and laws of Georgia or of the United States. Owing to the limitations on tax rates and debt, the lease and method of acquiring, selling or leasing gas works would doubtless require a popular vote. The courts of Georgia have given very wide interpretation to the term "municipal purposes" as used in the city charters, and have repeatedly refused to interfere with the discretion of the Mayor and Council under the phrase "as they may deem proper," which appears in this clause.

D 14. Ditto regarding consent of abutting property owners to use of streets?

Wheeling. This subject has never been ruled upon by the courts, but probably a franchise contract provision on this would be considered as affecting the governmental powers of the city, and, therefore, illegal. The special act of March 15, 1881, gives the city the right to order streets paved, with or without the consent of the property owners.

Norfolk. Not mentioned in the statutes, but the city probably might require it under the Act of January 18, 1904, which virtually gives the city discretion over all such matters.

Atlanta. Such consent not required.

D 15. Ditto regarding period within which construction must be begun?

Wheeling. A proper subject of contract under the principle explained under D 6.

Norfolk. The city has the right to enter into detailed contracts on this matter for the future. Act of January 18, 1904.

Atlanta. No provisions on the subject.

D 16. Ditto regarding period within which the plant must be completed?

Wheeling. Proper subject of contract on the principle explained under D 6.

Norfolk. Answer the same as D 15.

Atlanta. No statutory provisions on the subject.

D 17. Ditto regarding monopoly rights or competitive plants furnishing the same or competing services?

Wheeling. Exclusive franchises are not permitted in West Virginia in any city under either special or general legislation. (Gas Co. *vs.* Parkersburg, 30 W. Va., 440.) By the same decision (pp. 440-441) an exclusive franchise for gas lighting would not prevent the city from granting an electric light franchise.

Norfolk. The Constitution of 1902 has not been interpreted, but in general it is anti-monopolistic. No legislation attempting to grant monopoly rights has yet been enacted. The city certainly has the right (Act of January 18, 1904) to introduce competing companies. It is doubtful if it has a right by formal contract to grant a monopoly; the Constitution (Art. 4, Sec. 63, Par. 18) forbids "any local, special or private law granting to any private corporation, association or individual any special or exclusive right, privilege or immunity."

Atlanta. No provisions.

D 18. Ditto regarding rates to be charged?

Wheeling. Probably a proper subject for contract. Decisions in the different States highly conflicting. Never ruled upon in West Virginia. The United States courts uniformly declare that no delegation of power over rates by the Legislature will be assumed. Such grants will be strictly construed. Many franchises in West Virginia, including the natural gas franchises in Wheeling, contain clauses which attempt to fix the rates by contract for the life of the franchise. None of these have been ruled upon by the courts.

Norfolk. May be fixed by contract (Constitution, Sec. 125; Act of January 18, 1904, Ch. 9; Code, Sec. 1294 I).

Prices have been established by the company as follows:

	Gross.	*Net.*
August 10, 1865	$6.00	$5.00
November 1, 1866	5.00	4.50
December 1, 1868	4.50	4.00
January 1, 1872	4.00	3.60
January 1, 1876	3.50	3.20
October 1, 1877	3.00	2.80
January 1, 1879	2.80	2.50
October 1, 1880	2.50	2.25
July 1, 1881	2.25	2.00
April 1, 1882	2.00	1.80
July 1, 1887	1.80	1.60

	Gross.	*Net.*	
July 1, 1888	$1.60	$1.40	
July 1, 1890	1.50	1.30	
July 1, 1892	1.40	1.20	
July 1, 1899 (Fuel)	1.20	1.00	
April 1, 1906 (Illum.)	1.20	1.00	Approved by Councils.
April 1, 1906 (Fuel)	1.20	1.00	

(Prices furnished by Secretary of the gas company.)

Atlanta. No provisions. Under the general powers of the city, it has contracted with the gas company on matters referred to under questions D 15, 16, 17, 18, 19, 21 and 24, as explained elsewhere; that is, questions D 57 *et seq.*, and also D 6.

D 19. Ditto regarding character and quality of service?

Wheeling. A proper subject for contract, as explained under D 6.

Norfolk. May be fixed by contract. Constitution, Section 125; Act of January 18, 1904, Ch. 9; Code, Section 1294 I.

Atlanta. No provisions.

D 20. Ditto regarding right of city to regulate operation?

Wheeling. A proper subject of contract, as explained under D 6.

Norfolk. May be fixed by contract. Constitution, Section 125; Act of January 18, 1904, Ch. 9; Code, Section 1294 I; also see D 3, and Sections 163 and 164 of the Constitution.

Atlanta. No provisions.

D 21. Ditto regarding taxation?

Wheeling. The city has no right to exempt from taxation. Probably would have the right to contract to hold the company harmless for taxes, or to compensate it for the same. Even the Legislature cannot exempt the company from taxation (Chesapeake *vs.* Miller, 19 W. Va., 408).

Norfolk. The Constitution (Art. 13) requires all property to be taxed at a uniform rate, levied and collected under general laws; the property to be assessed at the fair market value. Section 169 authorizes the classification of property for State and local taxes. Section 170 permits a license tax on property which cannot be reached by the *ad valorem* system, and permits a franchise tax. Where a franchise tax is levied on a corporation doing business in the State, or where the capital of a domestic corporation is taxed, shares of stock may not be further taxed. The same section limits narrowly local assessments for public improvements. Section 171 requires re-assessment of real estate once in five years. All taxation must be by general laws. There is a State annual registration fee of $25 for a capital of more than $200,000. By Section 41, in addition to the annual registration fee, there is a franchise tax, which, for a capital from $300,000 to $500,000, is $100. By the city charter (Ch. 5, Section 11) the city has the right to levy a license tax. By Chapter 87, Paragraph 16, Section 922 of the ordinances, the present gas company pays a gas license tax of $800 annually.

Atlanta. Answered under D 18.

D 22. Ditto regarding compensation for franchises, including all free services?

Wheeling. This subject has never been ruled upon by West Virginia courts. A contract clause covering it would probably be sustained by the courts.

Norfolk. Under the Constitution of 1902, and subsequent legislation, this matter may in future be made a subject of contract.

Atlanta. Under the general powers of the city, when the city has the right to keep a company out, it may require compensation; but since the franchise tax law of 1902, with amendments (Acts of 1903, No. 439), any payments or compensation exacted by the city under contract, under whatever name, shall be deducted from the franchise tax; provided that bridge rentals and street assessments are not to be included or considered as payments for the franchise. The method of administering this section is to collect the full franchise tax, and when this is paid, the company receives a credit on account or in full, as the case may be, to that amount on any local franchise tax under agreement.

D 23. Ditto regarding paving of streets?

Wheeling. Answered the same as D 22.

Norfolk. No paving required under the charter of existing gas company (Act of January 11, 1850), but the company is required when it opens a street to restore it to good order. An ordinance of May 29, 1902, makes the same requirement for all companies. The matter may be made a subject of contract under the new constitution (1902).

Atlanta. No provisions, except that the company must restore the streets to good order when it opens them.

D 24. Ditto regarding removal of mains from the streets?

Wheeling. Answer the same as D 22.

Norfolk. Constitution, Section 164; and Act of January 18, 1904, Ch. 9: Code, Section 1294 I, fix certain conditions for laying pipes, and authorize further restrictions by the city.

Atlanta. No specific provisions. The city has dealt with this by contract. See answer to D 18.

D 25. Ditto regarding issuance of stocks and bonds?

Wheeling. Probably not a proper subject of contract, as it might tend to cripple the corporation in performing its public duty.

Norfolk. Under the Act of May 21, 1903 (Ch. 5, Sec. 2, Par. *e*), every corporation has unlimited borrowing power. There is no limitation on the kind, length or rate of loans. The company may merge its property, rights and franchises at discretion. Mortgage loans require a majority vote of the stockholders. Under the constitution (Sec. 167) no stock or bonds may be issued until notice setting forth the amount, character and terms of such loan, and if property or services are to be received for the same the property or services must be fully described, and the valuation placed on them stated, to the State Corporation Commission, under oath. All issues under this clause must be approved by the State Corporation Commission. In view of these provisions, it is highly doubtful if the company might, by contract, restrain itself, or if the city has the right to enter into contract covering this point.

Atlanta. By the charter of the Atlanta Gas Light Company, shares of stock are to be $25 each. The Act of February 16, 1856, and the amending Act of October 14, 1889, make bond issues subject to approval by the stockholders.

D 26. Ditto regarding examination of records?

D 27. Ditto regarding audit of accounts?

D 28. Ditto regarding publication of reports?

D 29. Ditto regarding returns to public authorities?

Wheeling. The matters referred to under these questions are probably proper subjects of contract.

Norfolk. New constitution (Sec. 156) gives the State Corporation Commission all the supervisory powers of the State over corporations, including the full power of a judicial court to investigate. The Act of May 21, 1903, Section 14, requires a report to the clerk of the court of the annual meeting; Section 75 requires similar reports to the State Corporation Commission. The object of this statute seems to be merely for purpose of franchise, registration and income taxes. Such reports do not relate to operation. It is probable that in granting franchises in the future the city may make the matters referred to in questions 26, 27, 28 and 29 a subject of franchise contract.

Atlanta. There are no statutory provisions covering the matters referred to in questions D 26, 27, 28 and 29, except that companies make sworn returns to the Comptroller General for purposes of taxation. These returns are subject to revision by him, and he may hold public hearings on them.

D 30. Ditto regarding transfer of franchises to third parties?

Wheeling. I cannot find that this matter has been ruled upon by the West Virginia courts. There has been no specific delegation of power by the Legislature. In so much as every corporation has the right to borrow money and mortgage its property and franchises, it would seem doubtful to me if this were a proper subject of contract. It is certain that the city, under its present powers, could not prevent the transfer of a franchise in case of bankruptcy of the company. The general statutes (Sec. 2465) specifically provide that the purchaser of a bankrupt corporation succeeds to all the rights and franchises. Section 1049 of the general statutes provides that a company shall forfeit its franchises to the State for making false oath to escape a license tax.

Norfolk. The Act of May 21, 1903 (Ch. 5, Sec. 40), as amended by Acts of 1904 (p. 88), authorizes a universal merging or consolidation of corporations for carrying on the same or similar business, domestic or foreign, upon paying the registration fee. The same act (Ch. 5, Sec. 2, Par. *h*) permits a company, "if authorized to do it in its charter," to purchase, acquire, guarantee or become surety for the stock, bonds, or other obligations of other companies.

Atlanta. By the Constitution of 1877 (Art. 4, Sec. 2; Code, 5800), corporations are forbidden to buy stock in any other corporation, foreign or domestic, "which may have the effect, or be intended to have the effect, to defeat or lessen competition in their respective businesses, or to encourage monopoly (104 Ga., 193; 107 Ga., 644; 113 Ga., 476; and 119 Ga., 590). It may be inferred from this that the sale or transfer of a franchise might be permitted where it did not lessen or destroy competition.

D 31. Ditto regarding labor clauses?

Wheeling. Probably a proper subject of contract.

Norfolk. Subject to contract with the city. The act of March 3, 1892, forbids any corporation to attempt to keep one of its discharged employees from obtaining employment elsewhere.

Atlanta. No specific statutory provisions.

D 32. Ditto regarding other important matters, including renewal of franchises?

Wheeling. The statute of February 18, 1901, limits franchises to 50 years, and gives the city the right of renewal for another period of 50 years. I think it plain that the city can, within this limitation, contract for the renewal of franchises. Ch. 49, Acts of 1905 (General Statutes, Sec. 1871) gives the Circuit Court in the locality where a public service corporation enjoys a franchise jurisdiction to compel the company by mandamus to keep and fulfill all the terms and conditions of its franchise "whether such obligation and duty be voluntarily assumed, or by law attached thereto and imposed thereby."

Norfolk. Constitution, Section 164, and Act of January 18, 1904, Ch. 9, require a State charter or license, permission of the city by ordinance, sale by auction, conditions to terminate the franchise to be stated in the franchise, the right of the city on termination of period to take on terms agreed upon, but without value for the franchise, and to hold, operate or lease, by way of renewal, under the conditions fixed in this statute, with the right of the city to place additional restrictions (not mentioned in the statute). The city is prohibited from making any grant for more than thirty years.

The granting of franchises under the recent Constitutional and statutory provisions is a matter of much doubt. Exclusive privileges are prohibited. When Mr. R. B. Fentress, about three years ago, introduced a blanket ordinance for furnishing light.

heat and power by gas, electricity or steam, it was seriously questioned if, under the auction clause, a franchise of any sort could be granted to any individual, firm or corporation, except he be the highest bidder. Serious question was also raised as to whether the franchise for each purpose ought not to be dealt with separately. The electric railway and lighting company already doing business in the city intimated that it would regard it but little less than blackmail to be compelled to bid on a franchise covering, for instance, the use of electricity, when it was already in possession of a franchise for the whole city for exactly the same purpose. The result of Mr. Penrose' three years agitation was a voluntary offer on the part of the old company to reduce prices all round, which offer, I understand, has been approved by ordinance or resolution since my visit to Norfolk, on the mutual understanding that no competing franchise would be granted. It is doubtful under the legislation just stated whether such an understanding or agreement could be enforced in law, as it certainly is a restraint on competition.

Atlanta. No specific statutory provisions. The right to contract under the charter is a continuing one. There is a special provision of the general law (Act of December 21, 1897) providing that when an insolvent corporation is sold under foreclosure, the franchises shall be considered property, and the buyer shall enjoy all of the rights and privileges conveyed by the franchise.

D 33. What remedies, penalties and means of enforcing the above provisions (D 6-32), have been provided?

D 34. Are they effective?

D 35. If defective in any regard and the provisions are not enforced, state in what respects and give reasons.

Wheeling. The original charter of the gas company was so liberal to the company that the only power left to the city with which it could defend itself was to purchase the company, which it did. Therefore, these questions have no application to the history of Wheeling.

Norfolk. Provisions now in force do not apply to the present company, which got its rights under a different constitution and different code of law. Under the new constitution and statutes, as explained above, the State Corporation Commission has all of the supervisory powers of the state over corporations, and the city has very wide powers of fixing terms, conditions and restrictions for the future. None of these powers have been tested in Norfolk, as the present company, under its blanket charter, which makes no mention of these matters, claims a contract with the state.

Atlanta. No provisions for remedies and penalties, except for failure to make returns for taxation. Penalty for such neglect, double taxes or imprisonment, or both, at the discretion of the court. To fail to pay a license tax in advance is a misdemeanor, and an indictable offense. These questions do not apply to the present gas company, whose charter is a sort of roving license.

making the company independent of the city. The remedies provided in other kinds of franchises (more recently granted) have not yet been tested. There is every evidence that recent franchises have been carefully drawn with a view of making the duties and obligations of the corporations clear, and enforcing them upon the company. The tax provisions, with their penalties, are strictly enforced, and are highly effective. As a sample of the care with which recent franchises are granted, the franchise of the Southern Lighting and Power Company, approved December 26, 1905, is instructive (See the franchise in the answer to D 6).

D 36. Give complete list of all gas franchises now in force in the following form:

(1) Name.
(2) Date of issue.
(3) By what authority granted.
(4) Duration.
(5) Exclusive or competitive.
(6) Approximate mileage of streets granted to company.

Wheeling. There are four gas franchises (all of them natural gas) in force in Wheeling, and all forbidding the use of the gas for lighting purposes; all granted by the City Council. Two of the franchises, namely, that to the Manufacturers' Gas Company, April 2, 1886, and that to the Citizens' Gas Company, June 5, 1888, are grants to these two associations of manufacturers and merchants, to furnish gas to their own members only. The grants do not permit these associations to enter into the general gas business. The grants to these two unincorporated associations are unlimited in time, and from their nature are neither exclusive or competitive. The mileage of streets occupied by the pipes of these two associations, I was unable to determine. The franchise of the Natural Gas Company of West Virginia was granted April 17, 1885, and amended March 24, 1896. Its duration is unlimited; it is in specific terms exclusive, and for the whole area of the city. Mileage of city streets (1906) 46.77. The grant to the Virginia Oil and Gas Company is dated July 15, 1904, for 50 years; competitive in terms and for the whole city. There is every reason to suppose that the exclusive grant to the Natural Gas Company of West Virginia was illegal from the beginning; that the company so regards it seems probable from the fact that it took no legal steps to prevent the City from granting the franchise July 15, 1904, to the Virginia Oil and Gas Company for all the streets in the city. Both these companies are specifically prohibited from furnishing gas for illuminating purposes, and thus competing with the publicly-owned works.

Norfolk. Properly speaking, there is no City gas franchise in force in Norfolk, as the City Gas Company of Norfolk, the only one in the city, obtained its rights in the street directly from the Legislature in its charter (Special Act, January 11, 1850; legislative amendments, January 18, 1884, January 31, 1890: amendment by Corporation Court, June 15, 1896). The company's franchise is perpetual, not exclusive, and for the whole county and city of Norfolk.

Atlanta. The only gas franchise in force in Atlanta is that of the Atlanta Gas Light Company, granted, not by the city, but directly by the State, in the special charter of February 16, 1856. It is perpetual, competitive and for all the streets of Atlanta. The company's charter does not authorize it to furnish gas outside of Atlanta. The company does, however, furnish gas outside of the city, and conforms to the requirement that a company, to lay gas pipes outside of an incorporated city or town, requires permits from the county authorities. The first permits from the county authorities of which I find record were issued on December 2, 1898. The company now does a considerable business outside of the city limits. The charter of 1856 simply authorizes the company to furnish gas "in the City of Atlanta," but the company has always interpreted this as authority to operate in all territory annexed to the City of Atlanta since the charter was granted, a half century ago. This point has never been judicially determined, or legally questioned. The corporate limits of the city have been extended at seven different times since the incorporation of the city. It is probable that the court would sustain the right of the company to furnish gas in any of the annexed territory. It is not improbable that the company will obviate the necessity of a judicial determination of its right to furnish outside the city limits by organizing a separate corporation to take over those portions of its works and business lying outside the city limits.

See also answer to A 13.

D 37. State for each franchise the conditions upon which the franchises may be declared forfeited.

Wheeling. No provisions for forfeiting the grants to the two private associations, except for failure to accept their respective grants before certain specified dates. Such failure did not take place.

The Natural Gas Company of West Virginia was to forfeit its rights for failure to begin drilling for gas within 60 days, and for failure to furnish gas in Wheeling within 18 months; also for failure to accept its ordinance before May 15, 1886. The exclusive privilege was to be forfeited if, after two years, the company failed to furnish an adequate supply of gas in the sections of the city where the supply was demanded. The amendment of March 24, 1896, permitted the increase of price to 20 cents, with a discount of 2 cents for payment within 10 days, but this amendment was to be forfeited in case the company failed to furnish an adequate supply for the whole city, and unless the amendment was accepted by the company.

The Virginia Oil and Gas Company was to forfeit its rights for failure to carry gas within the city in less than a year, or to accept the ordinance within 60 days. This company apparently came to an understanding at an early date with the Natural Gas

Company of West Virginia, and has never attempted to sell gas in Wheeling. It carries gas through Wheeling, and under its franchise furnishes gas in Wheeling to one or two public buildings.

Norfolk. The company, being in the city by specific and direct grant of the Legislature, cannot be ousted save under the general sovereign powers of the State, and with full compensation.

Atlanta. The company, having obtained its city rights directly from the Legislature, cannot be ousted save by judicial process at the instigation of the State itself.

D 38. State for each the time, method and terms of acquisition by city.

Wheeling. There is no such right as regards any of the companies, except the Natural Gas Company of West Virginia. The city has the right to purchase this company after 20 years, or at the end of any five year period thereafter, upon six months' notice, at a price to be fixed by arbitration, and the arbitrators "shall have regard alone to the then actual value of the property and rights to be purchased by the city, excepting the said gas wells, the value of which shall be the original cost thereof to the company, and they shall not consider the value of the franchises, or grants of privileges to such company, from any public authority, body or corporation, or the dividends or profits accruing to the stockholders." It is clear that under this provision the city, in case it purchased, would have to pay the original cost of all exhausted and partially exhausted gas wells. The clause practically prevents purchase from the fact that the city has no knowledge, or control of the methods, of the company's bookkeeping.

Norfolk. Largely answered under the preceding question, D 37. The only method by which the city can acquire is under the right of eminent domain (Constitution, 1902, Section 159; Act of January 18, 1904). The City of Norfolk also had the right to take property for public use by condemnation under Section 22 of the Act of June 21, 1884. Whether or not the city could have exercised this right legally against a quasi-public corporation, before the adoption of the Constitution of 1902, may be doubtful. That it could do so under the present constitution, if authorized to do so by legislative act, seems clear. The Legislature has given cities the right to condemn *private* property for any lawful municipal purpose, but has not yet granted the municipalities power to condemn property already devoted to a public use; that is, the property of public service corporations.

Atlanta. There are no prohibitions on the city. The question falls under the answer to D 2 (*c*), as does also D 39. The right of the city to purchase or construct gas works under its general corporate powers has not been judicially determined. Probably no city would assume such authority without enabling legislation.

D 39. State for each the method by which plant thus acquired may be utilized.

Wheeling. No provisions on this subject in any of the franchises. The city, as explained elsewhere, has full power to operate; or, at least, it would have for artificial gas works. Whether or not they could go outside the city to operate a natural gas company is not determined. The city has extra-territorial powers in regard to water supply.

Norfolk. Under the Constitution (Section 127) and the Act of January 18, 1904 (Ch. 9), such works may be operated, sold or leased.

Atlanta. ———

D 40. State for each whether consent of abutting property owners was required before pipes could be laid.

No such consent required under any of the franchises in any of the cities.

D 41. State for each the period within which the construction had to be begun.

Wheeling. No provisions except that the Natural Gas Company of West Virginia had to begin drilling within 60 days after the passage of the ordinance.

Norfolk. No provisions.

Atlanta. By contract of April 5, 1855, "immediately."

D 42. State for each the period within which the plant had to be completed.

Wheeling. The Natural Gas Company of West Virginia was required to bring gas into the city through its own pipes within 18 months; the Virginia Oil and Gas Company, to carry gas within the city limits within a year.

Norfolk. Matters referred to under questions D 42 to 55, inclusive, are not mentioned in regard to the City Gas Company of Norfolk.

Atlanta. Within ten months, by contract of April 5, 1855.

D 43. State for each the provisions regarding the rates to be charged.

Wheeling. The two private associations are unrestrained in this matter. The Natural Gas Company of West Virginia—maximum to private consumers 15 cents per thousand. Special contracts at lower figures specifically authorized to any person. By amended ordinance (March 24, 1890, Sec. 5), maximum, 20 cents, with discount of 2 cents for prompt payment, if maximum be charged; provided, that if the company do not furnish an adequate supply to the whole city under this amendment, the city may repeal the amendment without the consent of the company. There was provision also for a larger amount of free service for public purposes. The Virginia Oil and Gas Company—limited to a maximum of 13 cents, with a discount of 2 cents for prompt payment.

Special contracts at lower rates specifically authorized. Company forbidden to charge meter rent.

Atlanta. By contract (April 5, 1855), a maximum of 50 cents a *hundred* cubic feet. The actual prices voluntarily charged by the company have been as follows:

Nov., 1868..	$5.50 per M.	Discount of 50c.	U. S. Gov't tax, 15c.
Jan., 1871..	5.00 "	" 50c.	" " " 15c.
Feb., 1875..	4.50 "	" 50c.	
Oct., 1876..	4.00 "	" 50c.	
Oct., 1878..	3.50 "	" 50c.	
Jan., 1881..	3.00 "	" 10%.	
July, 1883..	2.50 "	" 20%.	
July, 1884..	1.80 "	" 30c.	
Nov., 1884..	1.50 "	" 33 1/3%.	
April, 1891..	1.10 "	" 10c.	(To the present.)

These prices are certified to by the president of the company. Data regarding earlier prices are lacking.

D 44. State for each the provisions regarding: (*a*) candle power, (*b*) purity, (*c*) calorific character, (*d*) pressure, (*e*) other elements of service.

Wheeling. None of the companies under their ordinances are permitted to furnish gas for illuminating purposes. There is no mention in any of the franchises of matters inquired about in this question.

Atlanta. There are no legal provisions on these matters in the charter, and none of them are mentioned in the contract of April 5, 1855.

D 45. State for each the provisions regarding plant and equipment.

Wheeling. This matter not mentioned, except as explained under questions D 41 and 42, for the two regular corporations, except that the Virginia Oil and Gas Company must have all of the material used approved by the Board of Public Works, the Council reserving the right to annul any judgment of such board or its inspector. The top of the pipes of this company to be 18 inches below the established grade. And the further exception that in the case of the Natural Gas Company of West Virginia (Ordinance of April 17, 1885), the pipes are to be approved by the Board of Public Works, inspected by an appointee of that board, to be paid $5 a day by the company, the Council reserving the right to annul any judgment of the inspector of the board. All pipes, material, and work to be subject to the approval of said board.

Atlanta. No provisions.

D 46. State for each the rights reserved to the city to regulate operation.

No reservations in any franchise for any city.

D 47. State for each the provisions as to taxation.

Wheeling. Not mentioned in any franchise. The constitution and statutes require all property, unless especially exempt, to be taxed. None of the property of these companies is exempt.

Norfolk. There are no special provisions relating to this or any other gas companies. Such companies are subject to the general taxing power of the State.

Atlanta. By contract of April 5, 1855, with the city, complete exemption from taxation for fifty years, the period of the contract. See also answer to D 18.

By the original contract for introducing gas into Atlanta, between the City of Atlanta and William H. Helme, dated April 5, 1855, and the exemption from taxation under it, the city authorized the said Helme to form a corporation and assign the contract to the same. The contract called for the construction within 10 months of works capable of supplying 20,000 cubic feet per day, and the laying of at least three miles of pipes. Additional pipes to be laid when, in the judgment of the Mayor, the gas supplied therefrom would amount to $50 per annum per hundred feet of pipe. Helme was to give three days notice to open the streets, and to leave the same in good condition. Any relaying of the pipes to suit the convenience of the city was to be done at the city's expense. The city was to erect 50 street lamps, burning 4 cubic feet per hour, and to pay the company for them at $30 each per annum on a moonlight schedule. The stock of the company was to be $50,000, shares par $25 each, of which the city subscribed two-fifths. The price was fixed at a maximum of 50 cents per hundred cubic feet, and was to be the same for public and private use, except for the street lamps. Said Helme was to form a company to take over the contract, and the company was formed to have the exclusive privilege of lighting the City of Atlanta for the term of 50 years, and to be exempt from city taxes.

The Atlanta Gas Company was chartered February 16, 1856, to carry out this contract. No reference is made in the charter to the contract or the exclusive privilege and exemption from taxation provided for in the contract. It has never been judicially determined whether the city had the right under the then existing constitution to make such a contract, and, consequently, whether or not the contract became in fact a part of the charter. For about thirty years each party adhered to the contract. The city at the beginning acquired 800 shares (par, $25), and paid for it by seven per cent. city bonds direct. By 1887, through stock dividends, the city's holdings amounted to 1,333 shares. In 1887 the city sold its stock—original cost $20,000—for $140,000, having meanwhile received a total of about $50,000 in cash dividends.

The city then undertook to repudiate the contract of April 5, 1855, on the ground that under its charter the city had no right to enter into such a contract. In 1890, ignoring the fact that the company, under the contract, was exempt from all city taxes, the city proceeded to assess all of the property of the company for taxes. The company contested this right, and plead the validity of the contract. Although the case was compromised, it involved so many interests, and some looking especially toward the future, that it was deemed best by the parties to have the compromise take the form of a decree of the court. The decree (Court of Fulton County, October 7, 1893) authorized the city to assess the company for taxes at a valuation of $175,000, much less than the then value of the property. This assessment was to hold for each year until the end of the contract period (that is, to 1905). The company had asked the court, in case the contract was declared invalid, to order the city to repay to the company all that it had made in profits out of its holdings in the company. The company was perpetually enjoined from trying to collect such sums from the city, while the city was enjoined from attempting to interfere with the purchase by the company of its rival, The Gate City Gas Light Company. It was decreed that in case of such purchase, as well as in the case of any other additions to the property of the company, by construction or otherwise, such additions should be subject to assessment for city taxes in addition to the fixed valuation of $175,000 referred to above. Thus, by compromise decree of the court, was mangled the exclusive privilege of furnishing gas for public and private use for 50 years, with complete exemption of the company from taxation for the whole period. This decree of the court covered the whole period to the end of the 50 years contracted for in the original contract. The city seems to have lived up to this decree, although the company has been caused much annoyance from the fact that the State Comptroller, under the franchise tax law, assesses this company. He refuses to take official notice of this decree, and assesses the company, issues his execution for the collection, whereupon the company is compelled to petition the city to be released from the payment on account of the court decree. The city government thereupon issues the necessary orders annually to stop the collection.

Owing to the purchase of the Gate City company and other additions to the property, the company has been paying in recent years on a city assessment (1905) of $330,000, apart from the valuation of the franchise. As the contract period covered by the decree of the court has now expired, and the contract of 1855, so far as it was not abrogated by the court decree of 1893, has expired, the company now has no claim to any exclusive privilege or any further exemption from taxation.

It seems to me that the contract of 1855 was permitted by the constitution and legislation of that time. Both these important provisions, exemption from taxation and exclusive franchises, are forbidden by the present constitution.

Under the decree of the court of October 7, 1893, the company has not only been subject to the trouble with the State Comptroller, but has also been beset by various suits which look very much like blackmail, the alleged purpose of which was to have the property of the company assessed for city taxation at its full value. One of these cases, begun in the Superior Court in 1903, was especially noteworthy. This petition denied the legality of the exemption from the beginning, and, after making allowance for the holdings of the city in the company and for the taxes paid under the decree of 1893, claimed that the company still owed the city for taxes a sum total of $203,327.80. The petition also laid great stress on the difference in valuation for city and for state purposes. It further set forth that the company was paying city taxes on a valuation of $300,000; that at the same time it had a bonded debt of $1,150,000, at 5 per cent., and that the bonds were selling at 105. The petition alleged that the property of the company was worth $2,000,000.

In a letter from the counsel of the company to the president, dated March 13, 1903, it is stated that plaintiff's attorney offered to drop the case for $1,500, and admitted that if this were done he would retain two-thirds and his client get one-third. The counsel declared that the proposition ought not to be considered for a moment.

In 1905 the preferred stock of the company was $600,000; common, $1,014,625; the first paying five per cent., the second, 4. In the return to the Comptroller General, March 15, 1903, the company declared that this stock had no market value; that there had been no sale within twelve months; and that a fair cash value of the tangible property was $500,000. This would make a total paid in interest and dividends of $143,385 on a tangible property of $500,000.

D 48. State for each the provisions as to compensation, including all free services.

Wheeling. The two private associations do no commercial business, and make no return to the city. The Natural Gas Company of West Virginia makes no money compensation, but agrees to furnish free all the gas needed by any public building, public school or works, near which such company shall lay its pipes. The Virginia Oil and Gas Company pays no money compensation, but is to furnish free gas for heating purposes at the city building, hose house or houses, near which the company shall have pipes. In case the city builds an additional crematory, the company must furnish an amount of gas thereto equal in amount to that now furnished by the Natural Gas Company of West Virginia to the present crematory. In case the Supreme Court of West Virginia or of the United States declares that this ordinance renders void or annuls the contract with the Natural Gas Company of West Virginia, this company shall furnish all the free gas needed for any two crematories of the city.

The company agrees further to furnish all the gas needed for heating purposes at the Wheeling Hospital and the City Hospital, and all the gas to be used for heating purposes at the city gas plant and at the city water works when the city shall have connected these plants with the pipes of the company, at 10 cents per thousand, net.

Norfolk. No compensation or free service provided for.

Atlanta. No free service or compensation required by charter or contract. In recent years, at least, the practice of the company has been to furnish no free gas, but to lay free service pipes up to 100 feet in length.

D 49. State for each the provisions as to street paving.

Wheeling. Sole requirement, same in all franchises, that the streets when opened be restored to good order. In case the companies neglect to do so, it may be done by the city at the expense of the company concerned.

Norfolk. Nothing, except charter requirement that company put the street in repair after opening it.

Atlanta. No provisions, except that the company put the streets in repair after opening.

D 50. State for each the provisions regarding the removal of mains.

Wheeling. Not mentioned in any franchise.

Norfolk. Not mentioned.

Atlanta. No statutory provisions or contract. Under 50-year contract, which expired April 5, 1905, the city agreed to move the gas mains when the city desired to have them moved, at its own expense.

D 51. State for each the provisions as to examination of records.

D 52. State for each the provisions as to audit of accounts.

D 53. State for each the provisions as to publication of reports.

Not mentioned in any of the franchises of any of the companies or in any of the charters of any of the cities.

D 54. State for each the provisions as to returns to public authorities.

Wheeling. Not mentioned in any case.

Norfolk. No provisions.

Atlanta. No provisions except as regards returns for taxation.

D 55. State for each the provisions as to transfer of franchise to third parties.

Wheeling. No provisions on this subject in any of the franchises.

Norfolk. This company, not requiring any consent from the city to operate therein, is subject to the sovereign powers of the state only. See answer to D 30.

Atlanta. No provisions as to franchises. All corporations are forbidden by Section 5800 of the Code, Constitution of 1877, Section 2 of Article 4, to buy stock or make contracts with any other corporation which may have the effect or be calculated to have the effect to lessen competition in their respective businesses, or to encourage monopoly. It is not clear to what extent these constitutional and statutory provisions, passed since the company was chartered, apply to this charter. (See Georgia Reports 100, p. 193; 107, p. 640; 115, p. 475; 119, p. 290, and Code of Georgia Sec. 3665.)

D 56. State for each the provisions as to labor.

Wheeling. Not mentioned in any franchise.

Norfolk. No provisions.

Atlanta. No provisions.

D 57. State for each the provisions as to other important matters, including renewals.

Wheeling. Renewals not mentioned in any franchise.

Norfolk. No renewal required, as the charter and the street rights, both granted by the State, are perpetual.

Atlanta. No renewals required, hence no provisions.

D 58. Has the municipality experienced difficulty in forcing companies to live up to the terms of their franchise?

Wheeling. No difficulty except with the Natural Gas Company of West Virginia. All the companies are forbidden by franchise to furnish gas for illuminating purposes. All of the city is not piped by the municipal gas department. The city charges 75 cents net for gas for illuminating purposes, and in some parts of the city a large portion of the time, even where the city has pipes, the gas is of poor quality, and the pressure wholly inadequate; while the maximum price with prompt payment for the natural gas (West Virginia company) is but 18 cents; and with the modern improved burner the natural gas is entirely suitable for illuminating purposes. It goes without saying that the natural gas company lends a willing ear to petitions for a gas supply, and is not very particular to find out to what use each of its customers puts his gas so long as he pays for it. The city inspection of gas fixtures and interior piping is very meager and inadequate. The result has been for a long time, and especially since the city works have failed to keep pace with the territorial growth of the city and the demand for illuminating gas, that the natural gas company has furnished a good deal of gas for illuminating purposes in direct violation of its ordinance, which specifically prohibits it from furnishing gas for illuminating purposes, and in set phrase declares that it shall not compete with the gas department of the city. Furthermore, the inability of the city to furnish all of the illuminating gas required has led to frequent petitions to the city on the part of citizens to be permitted to use natural gas for illuminating purposes. These petitions go first to the Council, are usually acted on favorably, and referred to the gas trustees. In granting these permits, the record sometimes states that they are granted because the city has no mains near the place to be served (Minutes of the gas trustees of May 13, 1905, and also of October 21 and December 18, 1905). Since the municipal gas works have fallen so far behind, I suspect that such permits are frequently granted where the city has pipes.

It is almost universally admitted that the city gas plant and distributing system need to be rebuilt, yet the Board of Trustees at the meeting of January 15, 1906, decided to drop the question of rebuilding the gas works until some definite decision on the right of the natural gas companies to furnish gas for illuminating purposes should be obtained, and reported to the Council that the trustees had done all they could in the matter, and that "it is up to Council to instruct City Solicitor what course to pursue." The records of the gas trustees show that on January 31, 1906, the City Solicitor reported that this communication to the Council was "sent back to board with instructions to discharge their duties as required by ordinance." The Council finally took the matter up, and instructed the City Solicitor to notify the company to desist from furnishing gas for illuminating purposes under threat of an injunction suit. The last I knew the Solicitor had given such notice, and had received no reply.

In 1905 the city undertook to enjoin a private citizen, James A. Henry, from using natural gas for illuminating purposes. The trial judge, Hugus, decided that when the gas had passed the consumers' meter, he could do what he wished with it.

The City Solicitor rendered an opinion after the Henry case to the effect that the company could be enjoined, and that plumbers could be restrained from making connection for illuminating purposes with natural gas. This opinion was published in the newspapers by order of the gas trustees nearly a year ago. (Minutes of October 14, 1905.)

The city has evidently had some hesitation in attempting, under all the circumstances, to enjoin the natural gas company from furnishing gas at a price which is just about one-fourth of what the city charges. The situation for the city, in view of the competition, first, with electricity, which has, as already indicated, passed beyond the competitive stage, all the franchises being controlled by the same party, and, next, in view of the competition with natural gas, which, by improvements in burners, largely since the natural gas franchises were granted, has become entirely suitable for all purposes for which gas is used, is truly a critical one. Investigations have been made and plans and estimates drawn for entirely reconstructing the municipal gas plant and distributing system; but, in view of the fierce competition with the natural gas companies, which have contract rights in the streets for more than a generation to come, the city government hesitates to reconstruct or build modern works, especially so long as they are threatened by the natural gas people with competition even in lighting.

On May 25, 1904, Engineer Isaac C. Baxter submitted to the gas trustees a report with complete estimates as to cost of construction and of operation, for a carburetted water gas plant, for a coal gas plant and for a joint or combined system, capable of producing at the beginning a million cubic feet per day, with provision made for a plant of double that capacity with the growth of the city. He stated that the largest daily manufacture during the preceding year was 660,000 cubic feet, at a cost of 42 cents per thousand in the holder. He estimated that amount of carburetted water gas at 37.37 cents. He estimated that with a modern coal gas plant to cost $80,000, the gas could be put in the holder at 33.13 cents, and with a combined oil, water and coal gas plant, to cost $100,000, the cost would be reduced to 28.72 cents.

Norfolk. The company having no grant from the city, the question does not apply. The company seems under the fear of competition to get on rather comfortably with the city.

Atlanta. The municipality has nothing to do with the franchises of this company.

D 59. State what provisions it has not been able to enforce, and why.

D 60. What remedies, penalties and means of enforcing the above provisions (D 57-59) have been provided?

Wheeling. Answered under D 58.

Norfolk. Answered elsewhere.

Atlanta. Answered under D 58. No penalties and no remedies.

D 61. How much deliberation has usually been given in the granting or renewal of franchises?

Wheeling. There seems to have been but little well-organized sentiment in Wheeling to hold down the private companies seeking franchises from the council. As explained in the answer to B 8, the statutes and rules of procedure, as well as traditions in the city, offered very little restraining force to keep the council from railroading through improper franchises. This was notably true until the Act of February 18, 1901, requiring publicity for thirty days before granting a franchise. The Council had proceeded in a very high-handed manner in dealing with franchises immediately preceding the Act of 1901, notably, in regard to street car franchises and electric lighting franchises. I was informed by the City Solicitor that the franchise of the Consumers' Electrical Company, granted April 6, 1899, was railroaded through, without even suspending the rules, at the same meeting at which it was originally introduced. It was generally charged that the company spent from $15,000 to $20,000 in getting the franchise through the council. Instead of being a competing company, as was pretended, this company is said to have paid $90,000 for the old company, whose franchise did not have very long to run, and then to have procured a thirty-year franchise for itself. About the same time, the newspapers charged high corruption among the members of the Council in connection with street car franchises. The papers even named members of the Council who were alleged to be recipients or seekers of money bribes.

I think it probable that the sentiment which brought about the enactment of the Act of 1901 will lead to a reasonably good enforcement of the act, and that the public sentiment back of the act will insist on a reasonable publicity under the act. I believe that the description given in the franchise case in Benwood, the adjoining municipality (53 W. Va., 472-475), would apply down to minute details to the conditions and methods prevailing in Wheeling before the year 1900. While I did not have the opportunity to gather the evidence, I have no doubt that before that date secrecy and improper influence were habitual in granting franchises in Wheeling. There certainly was no well-organized public sentiment to prevent this. I believe, however, that the Act of 1901 marks a turning point in the matter and that there is likely to be a high degree of publicity hereafter, and much less corruption.

Norfolk. The city seems to exercise considerable care in the matter. On November 9, 1905, Mr. R. B. Fentress petitioned for a gas, electric and steam franchise for light, heat and power. In accordance with the ordinance, his petition was presented at the expense of the petitioner in printed form. The matter was referred to a special committee of the two councils. This joint special committee referred the matter to City Engineer Brooks, City Electrician W. I. Smith and the City Attorney, who seem to have given the matter very careful consideration. This committee has given wide opportunity for the public and interested parties to be heard in the matter; has especially conferred with a special committee of the Retail Merchants' Association, and seems to have made some investigation elsewhere. The matter has been thoroughly discussed in the newspapers, and is expected to come up for action March 6, 1906. There has certainly been nothing secret about it, and everybody has had an opportunity to be heard (See Norfolk Dispatch, November 13, 1905). This seems to be the regular method of dealing with such matters in recent years.

I am informed (September, 1906) that the new franchise was refused, the old company reducing its prices, not only for gas, but for other services furnished by the companies controlled, not under a contract with the city, but with the approval of the reduced prices by the City Council, and under a sort of an understanding, or gentlemen's agreement, which probably could have no legal binding under the anti-monopolistic clause of the constitution, the city is not to introduce a competing company for ten years.

Atlanta. No gas franchise has ever been granted by the city except that under the contract of April 5, 1855. The city seems to be very careful in recent years in granting other kinds of franchises.

D 62. Has the exercise of the franchise granting power been attended with public scandal, and if so, in what respects?

D 63. How much publicity has usually accompanied the granting or renewal of franchises?

Wheeling. Both answered under D 61.

Norfolk. No public scandal so far as I have been able to discover. During my stay in Norfolk, mild insinuations of undue influence, but no specific charges. An editorial in the Norfolk

Dispatch of December 13, 1905, pleads for fair treatment of the railway and lighting company on the ground that about two years before, the company went out of politics, and adds: "As we see the situation, the company is not willing to give up to ward bosses, or to throw the door wide open for their henchmen by putting them on its payroll, but, on the contrary, it is offering the people direct concessions in the way of reduced tickets [street railway], and reduced gas and electric light charges. We cannot, therefore, expect to see those Councilmen who are looking for something in it for themselves, or who are obeying the dictation of bosses, to support any proposition which it may make, however business-like, and however desirable from the standpoint of the city."

Norfolk seems to be thoroughly committed to the theory of publicity.

Atlanta. Answered under D 61.

D 63. By whom are franchise grants usually drafted?

Wheeling. By persons seeking franchises; but, for the reasons mentioned under D 61, I think that in future they are likely to be worked over by the Council, with the aid of the City Solicitor.

Norfolk. In the first instance, by the petitioner, but they are thoroughly worked over in the committees of the Councils, as explained in the answer to D 61.

Atlanta. Answered under D 61.

LABOR AND POLITICS

United States Gas Works

(Schedule II)

By JOHN R. COMMONS and J. W. SULLIVAN

Wheeling.

The Wheeling Gas Works are conducted by the Board of Gas Trustees subject to appointment and control by the City Council. The Council consists of two "branches," the First Branch containing two members from each of the eight wards and the Second Branch four members from each ward. Elections are biennial for all members of the Second Branch, but each member of the First Branch holds office four years. All are elected on Democratic and Republican party tickets. Nominations are made by direct primaries, conducted by the executive committees of the party organizations. Each committee consists of one member from each ward elected by the party voters at the primaries. The Superintendent of the Gas Works is the Republican committeeman from his ward. The expenses of conducting the primaries are about $500, and this is assessed upon the candidates for the four chief positions of Mayor, Chief of Police, City Clerk and Wharfmaster. Candidates for positions in the Council are exempt from this assessment, as there is no salary attached to the position. The expense of conducting the election that follows is much heavier, and this is secured by another assessment upon the candidates nominated and by voluntary contributions, and the party in power also assesses all of the office holders and employees. In practice this latter assessment is deducted from the salaries and wages, and is paid over to the committee by the municipal disbursing officers. If a man refuses to allow his assessment to be deducted he is promptly "fired." The assessment upon employees of the Gas Department at the election of 1905 was as follows:

Republican Assessment, Gas Works, 1905.

Superintendent	$75
Engineers	10
Purifiers	10
Secretary	60
Superintendent of Electricity	40
Assistant Secretary	15
Collector	15
Meter Readers	10
Inspector	10
Two Engineers	10
Linemen	15
Chargers	2
Lamp Trimmers	8
Twenty-eight men	5

* The Council has the power to grant saloon licenses as well as franchises, and since Wheeling is largely of German population, twenty-one of the forty-four councilmen being of that extraction, the antagonism to the State policy of restrictive legislation regarding saloons shows itself in the election by the brewery and saloon interests of a large majority of the Council. The largest brewery proprietor is also principal stockholder in the second largest bank and is principal owner of one of the two street-car systems, and he and his associates are interested in a local telephone company, and are affiliated with the interests controlling the Electric Light Company and the Natural Gas Company. This combination of license and franchise interests has hitherto controlled the Council, but their grip has been challenged during the past four years by the other street-car company, which had been prevented by the combination from getting certain new franchise privileges asked for. This company has made considerable inroads in the primary elections of the Republican party held in December, 1906, where it secured the nomination of friendly Council candidates in three wards. It is aided by the defection of the second largest brewery interest, which has come over from the other combination, bringing the ward which it controls.

The interests connected with this second combination are in control of the largest banking institution and two smaller ones. Individual capitalists concerned in these two combinations are among the most public spirited men of Wheeling, as shown by their contribution of nearly $50,000 towards the new Y. M. C. A. building.

The fight between these street-car companies is severe. One of them gave leave of absence to about twenty of their motormen and conductors on pay for as high as two weeks in some cases to work for friendly candidates in the Republican primaries of 1906, and it is also the general practice of the companies to pay $10 or $12 on primary and election day for "workers" who are not otherwise in their service. Democratic motormen and conductors have been given their time and pay to work for Democratic candidates, while Republican motormen and conductors have done so for Republican candidates. Although the motormen and conductors have been organized since 1898, when they secured a reduction of hours after a three months' strike, and although this union prohibits political action as a body, yet it takes the ground that individuals may do as they please in politics. It is the individual's own concern if the company wishes his services as a political worker and pays him for it. Officers of the union, as well as members, engage in this political work on the company's time. The only stand which the union takes is that a man shall not be discharged if he refuses to do political work as requested by the Superintendent. Only one instance was found of such refusal, and this was where a man refused to work for candidates of the party opposed to his own. He however, consented to put in two weeks for the traction candidate of his own party. A large number of the motormen and conductors have secured their positions through the influence of Councilmen, and many of them were put in for the purpose of working for these Councillors in primaries and elections. The union tried to secure the "closed shop" but failed, one of its objects being to exclude the latter class of men.

---

* The statements as to the political situation in Wheeling, aside from what relates directly to the gas works, are Prof. Commons's.

Besides the expenditures on account of their own employees, the companies have paid other election expenses of candidates, and of the forty-four members of the Council there are thirteen and possibly others, who have been aided directly in this way by these corporate interests.

These corporations are affiliated with what is known as the "City Hall ring," some of the principal men of which are the Superintendent of the Gas Works, the Superintendent of the Water Works and the Chief of the Fire Department. This affiliation of corporations and city officials controls the nomination and election of Councillors, although for the past four years there have been internal conflicts and re-alignments, owing to the competition of the two traction interests for control. The object of these city officers in controlling the election of councilmen grows out of the fact that the Council elects the Gas Trustees, the Water Board and the Fire Chief. Consequently the superintendents in these departments see to it that the Councillors on these matters shall be friendly. The Superintendent of the Gas Works requires his employees to assist in the primaries and elections, and although the ward in which the Gas Works is situated is Democratic the majorities have been cut down and Republican candidates have been elected in individual cases, with a fair prospect of carrying the ward entire. It is partly on account of the political usefulness of these gas workers that the Superintendent has employed about 20 per cent. more men than are needed to do the work. He makes his appointments as much as possible to conciliate Councilmen.

There has never been but one or two notorious bribery cases in the Council, and those pertained only to one or two casting votes needed for a franchise. Money is spent rather in the primaries and elections, although the Councillors who are willing to accept them receive street-car passes.

The members of the two branches of the Council are as follows: 14 wage earners, 8 employers, 5 merchants, 4 physicians, 4 saloon keepers, 3 clerks, 2 restaurant keepers, 1 banker, 1 professional politician and 1 wholesale liquor dealer. None of the 14 wage earners are officials of trade-unions, but are what is known as "good mixers." One of them has not taken money from anybody to help himself in the primaries and elections, and he has declined a re-election. The others are aided in their campaigns by the money of the corporate combinations referred to above, and six of them are in the employment of the capitalists interested in those corporations.

Some of the employers and merchants are wealthy and others are small contractors and storekeepers, and all are affiliated in business and banking relations with the two factions of corporate interests. All but one of the physicians are of high standing. There is but one man of financial training in the Council, and he is serving his last year. He is Chairman and controlling figure on the Finance Committee. This is the most important committee from the standpoint of the Gas Works because it determines the budget and appropriations. The members are selected from both branches so as to give one member to each ward. The Chairman is a banker, and the others are two physicians, a manufacturer, a contractor, a salesman, a saloon keeper, and a wage-earner. The Chairman introduced the resolution in the Council some three years ago, at the request of the capitalists connected with the traction, electric light and natural gas interests, who desired to make a proposition to take over the municipal gas plant, to furnish city gas free, to sell gas at not to exceed the 75 cents charged by the city, to build a new gas works, and meanwhile to supply natural gas. The resolution was in the form of a request to secure the proposition, but it was voted down, and the proposition was not officially made public. Afterwards these same interests again projected a company and offered stock in influential quarters with the object of securing both the gas and water properties, but the extreme public opposition prevented consideration.

The Board of Gas Trustees, elected by the Council under a bi-partisan clause, are two Republicans and a McKinley Democrat. Their selection is practically controlled in the way already described, by the Superintendent of the Gas Works, who is their subordinate, and the Republican committeeman from the Fourth Ward. They are well-to-do men, only one of whom, a stockholder in one of the traction companies, is active in politics. He dominates the board. They meet semi-monthly, sign pay-rolls and bill checks. The Board of Trustees and the Council have been able to shift upon each other the responsibility of permitting the Gas Works to run down. For a time the Finance Committee did not allow the board its own revenues from gas sales, and the board threatened to resign, saying in a communication to the Council that unless it were allowed to make necessary repairs and build a new holder it would not remain responsible for accidents. Then for the past two years the Finance Committee and the Council have granted the board the revenues from gas, so that the Board has accumulated a surplus (December, 1905) of $23,000. But this remains in the bank, and no steps have been taken to build the required holder, whose cost is estimated at $15,000. Consumers some time ago began to use natural gas for illuminating purposes, contrary to the terms of the natural gas franchise. The option of the city to purchase the natural gas plant expired in April, 1905. The City Attorney, elected by the Council, instead of prosecuting the Natural Gas Company for breach of franchise in selling for illuminating purposes, brought suit against the consumers. He lost the case, and the number of consumers who have transferred to natural gas has increased, to the detriment of the municipal revenues. Finally, in April, 1906, the Gas Trustees employed counsel to apply for an injunction against the Natural Gas Company, but upon his appointment to the bench the proceedings fell again into the hands of the City Attorney and have been dropped.

Among the items in the list of Gas Works expenditures for 1905 was hauling coal and coke by contract, $8,840. A siding would save this expense, but it was impossible to determine whether the Board, the Council, the Finance Committee, the Superintendent, or the contractors were responsible for the failure to put in this siding.

All appointments and jobs in the Gas Department are given to adherents of the party in power. When the Republicans won the election in 1895 a clean sweep was made of the Democrats, and there have been but few changes since that time because the Republicans have held possession, and the employees have not failed to pay their political assessments.

Wages and trade-unionism in the Gas Works are also dependent on politics. The only members of a trade-union are the engineers, and these were forced to join the Engineers' Union through pressure brought by the Trades Assembly on one of the Councillors in a working-class ward, and through him upon the Superintendent. Consequently the engineers pay two sets of dues—one to the union and one to the Republican Committee. In the Electricity Department, also under management of the Gas Trustees, all of the eligible employees are members of the Electrical Workers' Union, and the conditions are the same as in the private electrical company, which also runs a union shop. Outside the engineers, the gas workers are non-union. In 1899 the Trades Assembly organized them with the object of securing the three-shift and eight-hour day, instead of the twelve-hour day which had always been the period of work. The policy of the Trades Assembly was to get the same pay for eight hours as the gas workers had been getting for twelve hours. But the gas workers took this in their own hands and offered to accept a reduction in wages in proportion to the reduction in hours. The demand was granted by the Gas Trustees, and the gas workers immediately dropped out of the union. Some time afterwards they petitioned for an increase in wages, but the Gas Trustees refused it on the ground of the agreement made when the eight-hour day was granted. The gas workers then threatened to strike, and the Gas Trustees threw upon the Council the onus of granting the increase. This was repeated in July, 1906, at which time the gas workers went out on strike for a few hours and a compromise was effected with the Mayor, the Chairman of the Gas Board, and the Superintendent. Wages were advanced to $2.25 per day for chargers and $2.15 for stokers. The increase in wages since the establishment of the eight-hour day amounts to about $7,000 a year.

The wages paid by the company to chargers and stokers before the city took over the works was $40 a month for twelve hours. The municipality advanced them to $60 a month, but the hours remained at twelve until 1899, as already stated. The advance in wages in 1906 to $2.25 is equivalent to $67.50 per month. The shift men's places must be represented seven days a week. A system of having "stand turn men" (substitutes) enables the regular hands to stay away at will. Some of the extra men make more in a month than the men whose places they take. A comparison of salaries and wages in 1880 and 1906 is as follows:

Salaries and Wages, Wheeling Gas Works.

Position.	1880.		1906.	
	No.	*Salary.*	*No.*	*Salary.*
Office Force—				
Secretary	1	$1,400.00	1	$1,400.00
Assistant Secretary	1	900.00	1	900.00
Collector	1	900.00	1	900.00
Inspector	1	720.00	..	......
Attending Calls	2	720.00	2	780.00
Gas Works—				
Superintendent	1	1,800.00	1	1,800.00
Engineers	1	720.00	2	900.00
Engineers	1	600.00	1	2.12 per day
Blacksmith	1	840.00	..	......
Blacksmith Assistant	1	480.00	..	......
Weigher	1	480.00	1	1.87 per day
Purifier	1	480.00	1	780.00
Chargers	6	780.00[1]	12	2.25 per day[2]
Stokers	16	720.00[1]	30	2.05 per day[2]
Laborers	2	1.50 *	7	1.62 per day[3]
Carman and yardman	1	480.00	2	1.80 per day[3]
Lamplighters	12	180.00	..	......

Richmond

The management of the gas service is in the hands of the City Council Committee on Light, which is composed of eleven members elected jointly by the Board of Aldermen (twenty-one members, three from each of the seven wards) and the Councilmen (thirty-five in all, five from each ward). The Mayor has no power of appointment on the committees managing public works. The Council supervises the departments through its control over appropriations. The Superintendent of the Gas Works is elected every two years by the Aldermen and Councilmen. He appoints the foreman and the hands at the works proper. The Inspector and eight Deputy Inspectors and the bill clerk, who are installed in an office in the City Hall, are elected every two years by the Committee on Light. Over these men, who constitute the commercial department of the gas plant, the Superintendent has no power of dismissal, though he has of suspension. The members of the City Council and the Board of Aldermen are representative citizens, substantial men, nearly all born and bred in Richmond. The investigators heard little talk about political scandals of any kind connected with the city, scandals giving rise to these being rare in its history. In city politics the blacks are disfranchised through the whites of both parties taking advantage of a "Yomaries" law, in force since 1877. The whites regardless of party make their choice of candidates at the Democratic primaries, no blacks appearing at them, and no one, white or black, attempting to hold a Republican primary. The candidates being nominated at the white primaries by the Australian ballot are invariably elected at the ensuing general election, which brings out only a small vote. A thousand Republicans at times vote at the white primaries. Most of the blacks never qualify as voters, the law requirements including payment of road, poll, and household furniture taxes. As many poor whites also do not qualify, Richmond's city government is in the hands of a restricted class of intelligent men, few of them being among the very poor. The opposition to the black is not economic; it is racial; the unity of the whites on local questions is the outcome of the civil war and reconstruction period.

---

* Per day.

[1] Twelve hours per day.

[2] Eight hours per day.

[3] Nine hours per day.

The pay of the Gas Department employees is designedly placed at a standard assumed to be necessary for the maintenance of a white man and his family. The lowest rate paid is for yard men, nine hours, $2. The retort house men work in two shifts of twelve hours each. The works force is made up of regular hands and substitutes. To be one of the latter formerly required no application; showing up at the gate was sufficient, so that a regular man could at any time bring in a friend. At present a substitute obtains his position by applying to the Superintendent, who keeps the force at such a point of strength as to enable all to earn a living. The pay-roll for the sixteen days Dec. 16 to 31, 1905, shows that of the six regular water-gas hands one put in seventeen days' time (one day overtime?), two sixteen, one fourteen, one nine, and one seven, while five substitutes had in this department respectively sixteen, twelve, four, three, and three days, and four had one day. The substitutes, who go on in rotation, may be sent to any part of the works, to the water-gas plant, the retort house, or the yard. They may thus in the course of the month earn a full hand's pay. The regular coal gas workers for the sixteen days mentioned numbered twenty-four, who shared their time with seventeen substitutes. In all, the regulars at the manufacturing plant (the Lower Works) numbered 63, with about twenty substitutes. At the Upper Works, where the construction and repair men report, the force was 49. The water-gas hands were paid $2.50 and $2.75; coal gas retort men, $2.50 and $2.75; in each class about two-thirds receiving the higher amount. Coke stand men had $2.50, coal stokers $2.25, ash rollers (heavers) $2, and yard men $2, carpenter $2.50, two bricklayers $2.70, a general repairer $2.75, engine room men $2.75. At the Upper Works the four pressure room men drew $3, the eighteen main and service pipe men $2.25, and men in intermediate positions $2.50. This rate of wage brings the lowest pay of laborers—the works yard men—to the same amount of money as is paid in the Chicago municipal departments, but the Richmond day is of nine hours as compared with Chicago's eight. The skill of the Richmond pipe men give them twenty-five cents more than the minimum rate.

But high wages are no longer found on the pay-rolls when one passes to the grades of the more skilled. The meter setters receive the same as the higher grade in Atlanta, 20 cents an hour. The mechanics draw union wages. The ditching for pipes is done by blacks, under contractors—nine hours, $1.25. The white retort house men of Richmond have double the wages of the black retort men in Atlanta. Such casual observations as the investigators were able to make of the Richmond men showed them to be the physical stalwarts that would be attracted by the high wages, and a passing impression is that in a competitive market their price would come to a considerably higher percentage than that for blacks. No black men are employed by the City of Richmond in any capacity.

The wage scale at the Richmond works has not been the result of labor or party politics. The Council fixed the present rates in 1872, as white men's pay. Substitutes may be at the works several years before becoming regulars. An engineer worked as retort man, yard man, and coal heaver, etc., until he found a regular place in the engine room. In 1905, six or eight substitutes were promoted, the Superintendent allotting vacancies to the men in his judgment the best. Regulars hold their jobs a long time; some have been in the service seventeen years. Nearly all live in the locality of the works, only five or six more than half a mile distant. The foreman pipe layer has been forty years with the plant and his brother thirty-eight. The Superintendent has been in the Richmond gas service twenty-nine years in various capacities. Under the Inspector at the City Hall four of the Deputy Inspectors are meter readers, three attend to complaints, and one is a bill clerk. There are also a book-keeper and an office clerk.

In no branch of the Light Department are the employees organized in unions. Wages and conditions are the result, not of the labor or municipal ownership movement of to-day, but of a local desire of the whites for a white man's government. No overtime is paid; the rule is give and take; when a man's overtime amounts to a day he takes a day off with pay. Yard men and street men get a half holiday Saturday, if no work is pressing. In cases of injury the Council usually allow full time and doctor's bill. The Superintendent reports the white laborer employed as very reliable; the twelve-hour shifts are exhausting and the men are obliged to take days off to rest up. Judging by the substitutes' time on the pay-rolls, however, the Richmond white retort men work no more steadily than the blacks in the same classification in the Atlanta works. These latter are regarded more sympathetically by their superiors. Retort house men stoke thirteen to seventeen retorts in the hour, but also wheel up coal, carry out coke, and clean up, averaging in all more than thirty minutes. They charge with the shovel, and not, like the Atlanta men, by means of scoops.

ATLANTA.

On the pay-rolls of the Atlanta Gas Light Company for the second half of December, 1905, the works force was represented by

157 names and the shop, construction, and other employees by 107. Of 50 part-time men on the rolls earning less than $10 in the fortnight, 30 were on the works and 20 on the rest of the force. The substitute system, by which a laborer may put a man in his place at his own option, is not in vogue, as at Richmond. Nine-tenths of the manufacturing men are negroes, the only whites in the department being the water-gas workers and a few skilled mechanics. The shop hands and fitters, inspectors, and foremen are white. All pay for wageworkers is made out by the hour. The negro laborer is put to work at ten cents an hour and an increase given him of one cent an hour for every five years of his service or for promotion in the character of his work. The rolls show that among the negroes at the works, part-time men included, just one-third were receiving the ten-cent rate, while one-fifth were receiving 12 cents or upward. Some of the blacks have been with the company twenty years, one man's length of service reading beyond thirty years. The testimony of the pay-rolls does not bear out the assertion, made by several of the white employers or others, that two-thirds of the negro force was very changeable, owing to the unsteady character of the race in that part of the South. A particular instance was given in which, after pay day, out of a force of 35 at the gas works only 22 reported for work. This would naturally be expected, however, even among white workmen, if they worked at gas stoking twelve hours a day for fifteen to seventeen days in succession. Such is the record of at least one-third of the negroes. One pay-roll of sixteen days in July with a possible of 192 hours, shows that of 116 negroes there were 40 who worked 191 hours and over, 32 who worked 151 to 190 hours, 30 who worked 101 to 150 hours, 4 who worked 51 to 100 hours, and 10 who worked 10 to 50 hours. Another pay-roll in January for 17 days with a possible 204 hours is as follows: 39 worked 204 hours and over, 40 worked 151 to 200 hours, 25 worked 101 to 150 hours, 16 worked 51 to 100 hours, and 17 worked 12 to 50 hours.

The company overlooks slight lapses in computing a man's term of service. The retort-house men work in two twelve-hour shifts; the shop men and construction force have a ten-hour day. In the retort house no mechanical stokers are in use; a long scoop is handled by three men. Out of every 80 minutes, 40 are taken up by a gang in charging and 40 in resting.

No branch of the company's force is organized in a union—gas makers, coal heavers, teamsters, machinists, carpenters, bricklayers, fitters, tappers, ditchmen, shophands, clerks. There has never been any attempt to organize the gas employees of Atlanta. There has been no organized strike of any part of the company's force. On one occasion several negroes assisting in operating the water-gas plant quit work, their places being immediately taken by white men, but at higher wages. Otherwise, two or three negroes walk out in a huff and after cooling off generally return, if permitted. The whites who as superiors are brought directly into contact with the blacks say that, with the majority, discharge is no discouragement, while they seem to find no encouragement in the increase of a cent or two an hour, pay for holidays, and car-loads of watermelons. The company does not profess to pay more than market rates for wages. The municipality of Atlanta gives its street cleaners, who are blacks, $1.10 for ten hours; they struck in 1905 for $1.25, but were beaten. The city water works pays a colored porter $1 a day, two drivers $1, a driver for the general manager $1.25, a helper to inspector $1.25, inside laborers $1 to $1.25 a day as needed, and outside laborers $1.25 to $1.50 a day as needed. On railroad construction work in northern Georgia blacks are paid $1.25, the commissary selling them provisions at cost. The gas company's work, however, is regular and permits a laborer to live at home. White labor in Atlanta is rarely employed below the mechanical trades. The pay level for the lower grades of skilled work is less than that for similar work in the North. At the Atlanta city water works, firemen get $1.50 a day and oilers $1.25, and on construction work tappers have $2 and $2.50, and caulkers and general utility men $1.75 and $2. The Atlanta Gas Company performs its own ditching and pipe laying; its colored caulkers are paid $1.25 a day, the white fitters from $1.75 to $2.75, most of them $2.50. The works staff consists of a Superintendent and Assistant Superintendent, the latter a technical graduate, one cadet engineer, one coke clerk, and one clerk on time checks, pay-rolls, and figuring results. The meter-reading is done in a few days at the end of each month by apprentice fitters, and other young men employed at $1 to $1.50 a day; the work is regarded by the officers as a form of instruction, a test of a beginner's capacity, and an opportunity for one to prove himself worthy of promotion. The company does not dock its hands for sickness, gives or takes a half hour of undertime or overtime, pays for a full-hour at same overtime, defrays medical expenses in case of accident, transports its shop force of fifty men back and forth from home to work free, buys the caps and badges of inspectors and collectors, pays the premiums on the bonds of all employees who handle cash, arranges for the privilege of employees to join the educational class of the America Gas Association, gives the laborers desirous of visiting homes in the country two or three days with pay, allows the porter and janitor a week's vacation and the salaried employees two weeks, never discharges a man on account of old age but gives him easier work, provides good lockers and shower baths at the works, has provided ventilation in building the retort-house addition, sells coke to all employees at a reduction of a cent a bushel, pays each man cash semi-monthly, and furnishes pure drinking water, with ice in the summer.

The following table shows for the occupations employing the largest number of men the rates of wages per hour paid by the Richmond municipal works and the Atlanta company:

Rates of Wages Per Hour, Richmond and Atlanta.

Occupation.	*Richmond.* Hours Per Day.	*Richmond.* Wages Per Hour.	*Atlanta.* Hours Per Day.	*Atlanta.* Wages Per Hour.
a Inspectors and Collectors	8	$85 per mo.	..	$50 to $65
b Stokers	12	20.8c.	12	10c. to 11c.
a Stokers, Foremen	12	22.9	12	15
a Gas Maker	12	22.9	12	16⅔
b Gas Maker, Helper	12	20.8	12	10 to 11
a Engineers	12	22.9	12	17½ to 20
b Yard Men	9	22.2	10	10 to 12
a Fitters	9	27.7	10	17 to 27½
b Fitters' Helpers	9	25.0	10	10 to 15
a Caulkers and Joint Makers	9	33.3	10	12½ to 15
a Caulkers and Joint Makers, Foreman	9	39.0	10	22½ to 25
b Laborers, Street	9	13.3[1]	10	12½
a Carpenter	9	27.7	10	30
a Bricklayer	9	30.0	10	30
a Blacksmith	9	33.3	10	20
a Blacksmith Helper	9	22.2	10	10
b Teamster	9	25.0	10	10 and 11

a, White; b, colored.

---

[1] Contract.

Note, March, 1907.—At Atlanta, since January, 1906, wages have been increased from one to two cents an hour on all the works' force.

(For additional data see appendix to this volume.)

The following report on Philadelphia was prepared under the direction of Mr. W. J. Clark, and has been revised by Mr. Sullivan.

PERSONNEL OF THE PHILADELPHIA GAS WORKS.

UNDER MUNICIPAL OPERATION FROM 1887 TO 1897 and UNDER LEASE TO THE UNITED GAS IMPROVEMENT COMPANY FROM 1897 TO 1906.

In schedules A and F of Exhibit A are shown the forms of organization among the higher officers employed by the United Gas Improvement Company and by the City of Philadelphia under the Bullitt Bill. Referring to the latter, it is apparent that the mayor cannot be expected to give valuable leadership to the details of the business. The duties shown on schedule F are not all that are required of him. Much time appears to be necessary to be devoted to receptions of divers committees of all kinds; he is a member of a number of boards and commissions, and a most important demand upon his time is in the conduct of large contracts involving heavy expenditures that are made by the city and conferences with members of Councils.

The mayors have not been men accustomed to the conduct or trained in the methods of industrial enterprises, with the exception of Mayor Fitler, who was a large manufacturer and capitalist.

It will be noticed, upon examination of schedule G, that all the departments of the Bureau of Gas were not subordinate to the mayor. The receiver of taxes, elected by the people, received the payment of all money due the Bureau of Gas. The controller, elected by the people, audited the accounts and paid the bills of the bureau. While the mayor, as executive head, in a measure corresponded to the president of the United Gas Improvement Company, it will be noticed that the Bureau of Gas was conducted without any one person in authority or whose word controlled all branches of the business.

Schedule F shows the appropriations for the year 1906 for the various bureaus under the jurisdiction of the mayor, and it is inserted to assist in conveying the proper estimate of the value of the executive head of the municipal operation of the gas works as a possible factor in the economical and efficient conduct of the business.

The advantage to the municipal operation of such information and experience as the mayor might acquire in his four years of association with the operation must, under the Bullitt Bill, be denied to it, as he is elected for four years and cannot succeed himself. His successor was in each case elected to office at the end of a political campaign which, though made up of many diversified principles engendered from many causes, had no bearing on the adaptability of the nominee for a high standard of ability as the executive head of the gas works.

The different mayors' grasp of the condition of the municipal plant is reflected in their annual reports. To illustrate their dependence upon information given them by their subordinates:

From the annual report of the mayor, 1895.

"The gas is not of the quality that it should be and there is no need of concealing the truth."

From the annual report of the same mayor, 1896.

"The gas manufactured by the Philadelphia Gas Works is equal in quality to that made in any city in the United States."

The director of public works approaches closer than any other official connected with the municipal operation the position of general manager, and schedule F shows the bureaus under his charge during 1906.

There is no record of a director of public works continuing in office for more than four years; some have remained less than one year. As an officer of the municipal operation of the gas plant, he was interested in the manufacture and distribution of gas and in the influence that the operation of the plant was to have on the general work of the administration. This was true also of the other bureaus under his supervision.

The Bureaus of Water, Filtration, Gas, Street Cleaning and Lighting employed a large number of men. It appears that a public official, such as a director of public works, must have much of his time occupied in giving audiences to callers and attention to the requests for employment of men made by councilmen and others. The large number of contracts connected with the bureaus must be discussed; in brief, the director's office is the centre of a business that has many branches.

No director of public works ever started his administration with practical experience in the gas business.

The City Councils may in their functions be said to have corresponded to the board of directors of a company. They received reports and made appropriations for the current expenses and for such extensions and enlargements as they decided proper, and they named the price of gas to the consumer.

Councils, elected by the people, were not necessarily under any ties of sympathy with the mayor's views as to the proper conduct of the work of the Bureau of Gas. In large private concerns this is considered of vital importance. In the great majority of such organizations (and such is the case in the United Gas Improvement Company), the president is elected by the shareholders. We therefore have in the municipal operation of the gas works by the City of Philadelphia under the Bullitt Bill a business conducted without one central head; a business in which the executive officer and his general manager assume the responsibilities of their offices without any previous training in the business, and in which offices they cannot continue for more than four years; a board of directors elected by the people without any reference to the policy of the executive, without any knowledge of the business and without any personal interest in the business. None of these men will suffer financially or in reputation through lax methods or indifference that is not complicated with their own dishonesty.

There was no indication in the municipal operation of the gas works that any one was strongly enough interested or had the power to have the money provided to adopt methods looking to an increase in the business. No reports of the mayors or directors have ever called attention to the need or the advisability of securing a larger return from the gas works by the methods—adopted in every private business—of advertising, soliciting or adopting their product to the wants of the consumer. Councils as the board of directors in all their ordinances considered solely the curtailing of the responsibilities of the municipal works and the city in their relation to the consumer. The ordinances were designed to make the work of the Bureau of Gas simpler and the burden upon the consumer heavier. The city would not run a service pipe for more than 18 feet, and it adopted arbitrary methods of securing itself against loss by holding the landlord responsible for the tenant. These are simply illustrations.

If in the conduct of a business conservation of energy and efficiency of the officers and workman is desirable in order that not only the greatest economy in manufacture and distribution is secured, but also the best quality of product, the best service to the consumer, whereby he secures the maximum value for his money, and ability to serve the maximum number of citizens—it would appear that the organization of the Bureau of Gas in a municipality operated under the Bullitt Bill must be inadequate and tend toward failure.

It will be born in mind that the Bureau of Gas passed into the hands of the mayor in 1887, after having made for itself, under the management of a special committee (called the board of trustees), a record of mismanagement, scandal and political debauchery that was a menace to the free institutions of the municipality.

During Municipal Operation of Gas Works—1887-1897.

Framework of system employed, see Exhibit "A."

Engineering Force—Chief of bureau William K. Park, succeeding himself as chief engineer of the gas works under the board of trustees. He reported to the director of public works, who reported to the mayor. Chief Park had full charge and was responsible for the operation and maintenance of the works, the improvements and enlargements thereto, the distributing system, care of meters and services and public lighting. He made an annual report to the director of public works, which was attached to the report of the director to the mayor. In his annual report it was expected that Chief Park would give data respecting the operation of the works and his proposals for extensions and enlargements. The reports of the directors accompanied the report of the mayor to Select Council. The requisitions for expenditures for the ensuing year were submitted to the Finance Committee of Councils and was finally acted on and passed by both branches of Councils. All money collected from the sale of gas, residuals or other sources was paid through the receiver of taxes into the City Treasury, and no money could be issued from the City Treasury except by ordinance of Councils.

Chief Park was 47 years of age at the time of assuming the duties of the chief of bureau. He was not a student of the technical branches of the business; not a reader of gas literature; had rudimentary training in the chemical and physical laws bearing on the industry; contributed no paper on any branch of the business to any gas journal or society; was frequently heard to express regret of his lack of technical training; was versed in political methods in force in the city; showed ability in keeping the gas works employees in the line of their political duty, as directed by those from whom he accepted orders; was not an active politician himself; devoted his entire time to the services required in his position; was a man of great physical courage; was charitable and well able to control the turbulent spirits that made up the workmen of the Bureau of Gas.

The assistant to chief and general store keeper consulted every day with the chief upon matters of policy and politics. His duties were confined almost exclusively to managing the store room of the Bureau of Gas, issuing orders for material and issuing material on orders of the superintendents.

At the Ninth Ward works, Superintendent Henry Corn, and at the Twenty-fifth Ward works, Superintendent John Fox were men not technically educated, Mr. Corn having been a brickmaker and Mr. Fox a hotel keeper and member of Select Council. They were not good practical mechanics; they were conversant with the political situation and managed their works in such a way as to meet with the approval of the chief of bureau, who always took occasion in his annual reports to thank his subordinates for the assistance rendered him during the year.

The superintendent of the Point Breeze works, William MacDonald, had had previous training in the gas business and had a mechanical training.

The architect and draguhtsman, during the greater part of the municipal operation was Mr. James G. Davis, who was a former employee of the Bureau of Highways, and who designed in detail many of the improvements and acted as inspector during the work.

The engineering force of the Works Department, consisting of the chief of bureau and superintendents of works, lacked cooperation. There was no period set aside for weekly or semimonthly meetings for the discussion of details in operation or criticisms of new plans. The superintendents were not consulted in the adoption of new methods. Chief Park when visiting the works stayed in the office, and only on the rarest occasions went into the works to see for himself. Criticisms or suggestions by superintendents were not well received by him. Initiativeness of superintendents was not allowed. In this respect a discipline of a military character was maintained.

There was no chemical department attached to the plant. An appropriation was made of $500 per year for the services of a consulting chemist and another appropriation of $500 per year for chemical analyses and tests of gas. These appropriations covered the work done for the entire bureau.

Each director of public works, under whom the chief of bureau operated, was selected by the mayor, who had the power of removal. The Bureau of Gas constituted one of their departments. They were also in charge of the Bureau of Highways, Bureau of Lighting, Bureau of Street Cleaning, Bureau of Surveys and Bureau of Water.

They were:

Under Mayor Fitler—Director of public works, General Louis Wagner.

Under Mayor Stewart—Director of public works, James H. Windrim.

Under Mayor Warwick—Director of public works, Thomas M. Thompson.

These men were all of high standing in the city. General Wagner was senior partner of the firm of Messrs. Wagner & Lane, fire insurance. Mr. James H. Windrim was an architect of high standing. Mr. Thomas M. Thompson was a merchant. Until university men, none of these gentlemen had been connected with the gas business or had given any attention to gas engineering. Their time was occupied in the large field that they controlled and in the various phases of municipal management that arose during their administrations. During their tenure of office, millions of dollars were appropriated for their departments, varying in amount as determined by Councils.

Director Wagner appears to have devoted the most time and energy on details of the gas business. He made almost weekly visits to the works and did not stop in the office, but went directly into the works to see for himself the methods and needs of the operation.

Director Windrim and Director Thompson rarely visited the works. All of them were obliged to rely almost exclusively on the advice and explanations presented to them by the chief of bureau.

During Lease of Gas Works to the United Gas Improvement Company

For framework of system employed, see Exhibit "A."

Engineering Force.—The operation and maintenance of the Works Department is directed by the engineer of works, who, with the engineer of distribution, reports to the third vice president of the United Gas Improvement Company.

The engineer of works, William H. Gartley, graduated from the Polytechnic College of Pennsylvania in mechanical engineering and from the United States Naval Academy as officer of engineering corps.

The assistant to engineer of works, Charles J. Ramsburg, took a four years' course at Cornell University in chemistry.

The superintendent of Point Breeze works, William F. Lane, has been connected with the gas industry for thirty years.

The superintendent of the Twenty-fifth Ward works, William F. Dornet, is a graduate of Cornell University in mechanical engineering.

The engineer of construction and superintendent of holders, J. W. Wood, has had thirty-two years of experience in gas manufacture.

The chief chemist, C. C. Tutwiler, is a graduate of Washington and Lee University and the Virginia Polytechnic College.

The chief photometrist, Charles O. Bond, is a graduate of the United States Naval Academy.

The chief inspector of machinery, William E. Saunders, is a graduate of Case College.

The engineer of works is in constant touch with his superior officer, the third vice president, who is in charge of the operation and engineering of all the industries of the United Gas Improvement Company.

Under the municipal operation, the chief of bureau, assistant to chief of bureau, and superintendents, with the exception of Mr. Davis, were appointed to their positions without previous training in the Philadelphia Gas Works; and all of these gentlemen, with the exception of Mr. MacDonald, superintendent of the Point Breeze works, with no previous training in any gas works. The chief of bureau was appointed first as assistant chief.

Under the lease to the United Gas Improvement Company, each position enumerated is occupied by a person who has had years of training in all the branches of gas manufacture, and who has been selected for the position solely on proven ability. In addition to having a superior officer entirely conversant with all the details of the gas business, the engineer of works is a member of the research committee of the United Gas Improvement Company and has the benefit of the advice of the entire engineering force of that company, both in the management of the many works operated outside of Philadelphia and in the research department, as well as the accumulated records and data of years of experience of the company.

The Research Committee of the United Gas Improvement Company direct the work of the Research Department, who confine themselves to the development and perfecting of the details of the business. The Research Department provides the engineering force with accurate data where formerly incomplete or misleading information existed. This department keeps in touch with all the literature, domestic and foreign, that is published on gas engineering. They have for their use a large experimental gas plant, erected at the Twenty-fifth Ward works, and a physical and chemical laboratory in the centre of the city.

The engineering force of the Philadelphia Gas Works has contributed to the various gas light associations of this country many new and valuable papers. One of this engineering force has worked out a more complete method of gas analysis, which he set forth in a paper read before the Franklin Institute, and which is adopted in this country and abroad as a standard method. This paper has been published in several languages, and may be found in the later English works dealing with the chemistry of gas.

The engineering force of the Philadelphia works have obtained a number of patents on details that have been generally adopted by the gas fraternity of this country.

The engineering force of the Philadelphia Gas Works under the Bureau of Gas did not produce any papers that were read before any of the technical societies or appear in any of the technical journals, nor did they obtain any patents in connection with the industry.

Promotion of Employees:

Under the Bureau of Gas, promotions, with scarcely an exception, were unknown. From 1887 until 1897 there was no change in the chief of bureau, assistant to chief of bureau or superintendents. These men held the positions to which they were originally appointed, with the exception of Mr. Corn, who had been promoted from a stoker.

Under the lease to the United Gas Improvement Company, a number of changes were made in the engineering force, due to the demand for the services of the members of the force by other companies at higher salaries and wider field of operation.

Under the Bureau of Gas, there being no promotion, there was no attempt to train men in the business, with a view to thus securing men who were able to fill vacancies.

Under the lease to the United Gas Improvement Company there are constant additions to the force from the graduates of technical institutions and manual training schools. These men are put through a course of not less than four years' work in all the branches, and with this force the Philadelphia Gas Works have supplied a large number of men who have gone to fill important positions with other companies—a sufficient testimony of the value of the training that they have received.

Method of Selecting Employees:

Under the municipal operation men were employed almost exclusively through political channels. The superintendent of the works had no authority to select employees. They were invariably provided by the chief of bureau. The necessity of having a means of employing additional men in case of an emergency never arose, because there were always more than enough men on the pay-rolls to meet any emergency.

The mayors found it necessary to have a sufficient number of men in Councils who would support the administration in carrying out its designs for the development and improvement of the affairs of the city. There has been no record of a successful administration resulting when carried on in antagonism to the majority of Councils. That this working majority might be had to help the mayor, it was and is absolutely essential that the administration must help the councilmen. The constituents of the councilmen from the wards adjoining the several gas works are not sufficiently educated in the higher ethics of the duties of citizens to the municipality to be shaken for a moment in the belief that their councilman's first duty is that of an employment agent and channel through which they may secure not only better livelihood for themselves but employment for those in whom they are interested, who are, through irregular habits or physical incompetency, unable to secure profitable employment through the ordinary law of supply and demand. It is absolutely necessary, therefore, that where men are to be selected for employment in those positions not classified under the Civil Service, these councilmen must be able to prove to their constituents that they are able to and do secure a large share of the appointments. This was absolutely essential in the wards adjoining the gas works to any councilman who desired re-election, and it was also essential that the administration should recognize this as a necessary patronage of these councilmen. It was necessary also that the men composing the central organization of the Republican party should have a share of this patronage and be able to give work to certain men. It is perhaps true that no detrimental effect should be experienced in the general standard of the employees of the gas works by this method of appointment, if the connection of the employees with their political sponsors stopped at the moment of appointment. By whom a man is selected is probably of no importance if he shall prove a valuable workman, but unfortunately the councilmen and politicians did not relinquish their interest in a man at the time of appointment. They could not. If a man proved incompetent and was suspended by the superintendent, the councilman was expected to show his ability to have that man reinstated, and in a vast number of cases the political patron would not consider the detrimental effect upon the discipline of the force thus returning an undesirable employee, but would force him back into the works against the wishes of the management. Such methods could only result in disorganization, great laxity of discipline, inequality of treatment and a sense of injustice pervading minds that were never strong in discriminative powers. The force of municipal employees of the Philadelphia Gas Works thus came to be composed of an unprecedentedly large proportion of men past the prime of life, of cripples, and of men intemperate in their habits and of an order of intelligence below that of the average skilled workman. Far different was the method of selecting and retaining employees for the Philadelphia Gas Improvement Company's plant, from which the city purchased water gas during that period. Many of its employees, although by no means all, it is true, were obtained through the councilmen of the adjacent wards; but once appointed these men received no privileges not enjoyed by other workmen. They had to conform to all the rules, and to do their work as well as the others or their discharge resulted. Cases arose where the dismissal of a man would be requested by the same councilman who secured his appointment, the presumption being that the man had changed his political allegiance. Under the Philadelphia Gas Improvement Company this request was never acceded to. When it was found that no exceptions were made to this rule, there was no further demand made by the councilmen. They were able to satisfy their constituents by showing that no one could do more than they could. (See appendix on page 46.)

The demand upon the councilmen from the industrial wards by their constituents to secure employment for them cannot be readily appreciated by people in other walks of life and from other districts. We have been told of a councilman whose daily experience it was to find at night, upon his return to his home, from twenty-five to fifty people waiting for him to use his influence in obtaining work of all kinds for them. At his evening meal, they would be sitting in the dining room, in the other rooms, and as many as five occupying chairs in his bed room.

The years from 1887 to 1897 formed a period of dire industrial depression in Philadelphia, the worst known to the last generation. The majority of the manufacturing plants, especially in the textile and woolen manufacturing establishments of Kensington and Richmond, had suspended operations, and the pressure brought to bear upon the clergy, priesthood and politicians of those districts will not soon be forgotten by them.

Under the United Gas Improvement Company's operation, the conditions of employment have materially changed and have been largely influenced by the prosperity in the manufacturing districts. As far as possible, at the beginning of the lease, old employees were retained, a policy since steadily maintained. At first it was found that there were sufficient men on the pay-rolls, working two shifts, eleven hours day and 13 hours night, to make three shifts of eight hours each, and this was done by increasing, in many instances, the rate of pay per hour. The disposal of the old men was made a subject of special attention and resulted in the formation of a pension list for those men who were over sixty years of age and had been employed in the gas works for not less than twenty-five years, and who were found to be of insufficient value as workmen. There were no men on the pay-roll who did not earn at least $1.20 per day. Discharges for the first six months were confined to those who flagrantly disobeyed the moderate and necessary rules laid down by the management, particularly in regard to intoxication.

Under the municipal operation, the average age of employees was much older than was consistent with good working force, and it became necessary under the United Gas Improvement Company's operation to get in younger men, more active physically and mentally. It was made plain by the United Gas Improvement Company that promotions in the works would be confined to selections from the force itself—the choice being solely on merit. Employees were notified that in the appointment of young men preference would be given to their sons. The company has today many of the older workmen who are keenly appreciative of the opportunities for learning the business and the advancement thus obtained for their sons' promotion.

Under municipal management, a superintendent might suspend, he could not select or discharge.

Under the United Gas Improvement Company's management the superintendent of the works has sole power to hire and discharge. The engineer of works and his subordinates cannot appoint a man to a position under a superintendent without his selection and approval. The engineer of works must listen to every workman who has a grievance, and must make a careful investigation into the merits of the case. Where it is apparent that even under the rules designed most carefully to do exact justice injustice has been done, the action of the superintendent may be reversed, but no man can be replaced under any particular superintendent against the latter's desire or consent.

System of Developing the Wage Earning Capacity of Employees.

Under municipal operation the lax and uniform discipline that prevailed among the workmen resulted in great irregularity in the daily routine. The men, being able to get higher wages than they were accustomed to earning in other employment, found the long night shift of thirteen hours in the poorly ventilated and designed retort houses of the City Gas Works most irksome, and a majority would never make full time on the night shift. The shift from day to night was made once a month. To meet this contingency, what was known as the "chance" list was adopted. On this list would be the names of men who were to be given the first opportunity of filling vacancies. At the beginning of the night shift, the night foreman would call the roll of the workmen, and the place of each absentee was filled from the men present whose names appeared on the "chance" list. During the week succeeding pay day, at times there would be as high as 60 per cent. of the regular working force absent, and their places would be filled from men on the "chance" list, many of whom had no previous experience in the gas works.

Under the United Gas Improvement Company's operation, there being no thirteen-hour shift, especial attention having been paid to ventilation in the retort and generating houses and the elimination of those men whose desire for intoxicants made them irregular in reporting, there is not noticeable any greater percentage of absenteeism in one shift than in another. The men generally make full time. In the exceptional cases, the real cause is known to the other workmen and the foreman and treated accordingly.

Under the municipal operation, the wages in the different branches of the works were not in proportion to the value of the work done. Certain branches of work were made to be almost wholly sinecures; they were much sought after and generally filled by men who were of unsual value to their political patrons. Under a competent foreman, the work of emptying and filling the purifying boxes is ordinarily laboring work, requiring pick, shovel and wheelbarrow. This work was made unnecessarily severe under the municipal operation because of the ammonia that should have been taken out previous to the piping of the gas into the purifying boxes, but was allowed to escape there, exposing the men to the pungent ammoniacal vapors. But still the work was only manual labor. There would have been no trouble in securing all the men necessary to do it at $1.50 per day, good wages for that class of labor at that time. There would have been no difficulty in securing that quality of labor at $1.25 per day. The purifying house men received $2.75 per day. There was an unnecessarily large force of these men, and they were paid for seven days per week, whether there was work for them or not. If there were no purifying boxes to be cleaned, it was not expected of them that they would be called upon to do other work. On Sundays these men reported for work in the morning, were marked up for the full day and left the works within an hour, without changing their clothing. Such a position was naturally in demand among active political workers. During campaigns these men would be excused from work for as much as ten days and be paid full time. Other illustrations at other points might be given, but this will suffice.

Under the United Gas Improvement Company's operation, the equalization of wages has been carefully considered. In every branch the wages have been increased since the beginning of the lease at least once; in some cases several times. It may be said that this is a natural consequence of the great industrial prosperity during these years; yet it must be born in mind that the employees of the municipality have not enjoyed any increase in wages during this time. At present there is agitation in the Fire Department, which has lately been organized, for increased pay, accompanied by a threat of proceeding against the city for violation of the law regulating the hours of municipal employees to not more than eight per day, and an attempt to collect wages due the firemen for working overtime dating from the passage of the ordinance in 1896. The yearly demand made upon the Finance Committee of Councils for raising the pay of the various branches of municipal employees has been met by the statement that the finances of the city at the present tax rate will not permit any increase.

Relation of Employees to Economy in Manufacture.

Under municipal operation, little need be said. The method of selecting employees, the lack of discipline among them, and the irregularity of operation at the plants reduced the efficiency of the working force to a low standard. The natural desire of the chief of bureau to reduce the cost of labor per thousand cubic feet was entirely lost in the necessity, under the system of political appointments, of getting the maximum number of men crowded on the pay-roll.

Director Wagner said in his annual report that upon assuming the office of director of public works he found that—

"The works were deficient in all that constituted a first-class gas works, of a construction for making good gas and at the lowest prices. Labor saving machinery had never been introduced, and but two stacks with modern appliances for carbonizing coal had been built. The employees numbered 2,237, and the cost for skilled and unskilled labor, especially the latter, was startling."

The energy and earnestness which Director Wagner found time to give to improving this condition in the Philadelphia gas works, and which was not duplicated by any of his successors, did not prove able to make any permanent headway against the political system in vogue. Under the Fitler administration, the purchase of water gas, decreasing the quantity of gas made by the city, and the introduction of semi-regenerative benches and charging and discharging machinery, effected a reduction in the total number of employees in the gas works and the labor per thousand cubic feet; yet these efforts were sporadic and incomplete, and ceased with Director Wagner. No comprehensive plans were adopted looking to the complete economy in labor in the cost of manufacture. As an illustration: In 1897, after ten years of municipal operation, there were at Point Breeze Gas Works thirty-eight boilers, scattered about the plant, none of them over 80 horse-power and aggregating not more than 1,200 horse-power. There were not more than two boilers at any one place; in whatever locality a demand for extra steam arose one or two small boilers were installed and connected to the point to be supplied. Many of these boilers were of the antiquated cylindrical type, without flues. They were attended by a fireman and a helper on each shift, and fired with coke—the most expensive fuel—hauled to the boilers by contractors' carts at $3.50 per day.

At one point, in a remote building, two of these plain cylindrical boilers, of about 15 horse-power, were thus attended and operated for the sole purpose of warming the cylinder oil in a barrel sufficiently to be drawn from the faucet. See attached photograph No. 255.

Many ingenious devices were adopted to give occasion to the employment of extra men. At the Twenty-fifth Ward works, the engineer of the exhauster engine could have run a water pump by the cutting through of a doorway to connect the two rooms (the operation of an exhauster engine is almost automatic), or the engineer operating the pump could have given his attention to the firing of the boiler in the adjoining room, having nothing to do but oil the pump and to attend to its packing; but the boilers had their firemen and helpers, the pump had its engineers and the exhauster engine its engineers and helpers.

The superintendent was not expected to require from any employee work in any other department than that to which he was attached. The result was that in an emergency some of the departments in which heavy labor was necessary and therefore not affording desirable positions would be desperately overworked, while surrounded with numbers of employees temporarily idle. The lack of proper management and the weakness of the engineering force, which was not bent on correcting these evils or on the adoption of the most modern equipment in the plant, magnified this unevenness.

Under the United Gas Improvement Company's operation, the efforts of the engineer of works and his assistant has been unremitting and consistent in the organization of the force of employees with a view to adjusting the plant so as to eliminate unnecessary labor, reduce the total number of men required and increase the general efficiency of each man. The best labor saving machinery had been adopted and properly cared for and improved upon. Many labor saving inventions have been devised by the engineering force to replace the more laborious and exhausting features of the work. As an illustration: At Point Breeze there are two boiler rooms, with large trunk steam mains radiating therefrom to supply the entire works. Photograph No. 418 shows one boiler room of 2,000 horse-power capacity, delivering at the time the photograph was taken 1,500 horse-power, using liquid fuel and attended to by one man per shift, the liquid fuel being one of the residuals from the plant.

As another illustration: By the invention of the stand-pipe cleaning machine by one of the engineers of the company, the laborious work of "balling" stand-pipes, requiring a large force of men, working close to the open mouth of the heated retort, has been replaced by one man, working for the entire house and not exposed to the intense heat of the open retorts.

The method of "balling" the stand-pipes under the municipal operation is shown in photograph No. 1955, which was only one operating a "ball", in cases of severe stoppage, which frequently occurred, it would require as high as six men on one "ball."

The stand-pipe cleaning machine installed by the company is shown on photograph No. 339A. It traverses the entire house on an overhead trolley, operated by one man, being equipped with pneumatic motors of 2 horse-power, and saving $20,000 yearly in labor in the retort houses of the Philadelphia gas works.

Conveyors for delivering coal from the coal shed to the overhead hoppers in the retort houses have replaced small buggies drawn by mules, attended by two men, one leading the mule and the other steering the buggies, loading the coal in on the floor. Photograph No. 713 shows the municipal method and photograph No. 1167 shows the conveyor for delivering the coal to the bins in the retort houses, under company's operation. The bin on one side of the retort house is shown in photograph No. 339 (previous exhibit).

In this particular of the relation of the engineers to economy in manufacture, the aim of the municipal and private management shows the greatest contrast. The municipal management was designed to make work or positions for employees; the private management requires the most careful study by the engineering force to minimize the quantity of labor. The municipal management resulted in indifference to the severity of the labor; the private management devoted itself to the elimination of arduous, exhausting toil. The municipal management debased the moral condition of the employees; the private management always had in view the uplift and elevation of the employees in every branch of the work.

Comfort of Employees.

Under the municipal operation, as stated, the prime consideration was to give men places. The comfort of the men received scant consideration, the effect upon the men being to render them indifferent. The retort houses were constructed with large window openings having iron louvres instead of sashes, so that the admission of light was coincident with the admission of air. The coolness of the houses forced the men to sit near these great openings in cold draughts while resting between the periods of charging and discharging, during which time heavy perspiration was induced. In other words, as stated by the men, their backs froze while their faces burned.

In inclement weather the wheeling out of coke by hand required men to work between snow or rain one minute and the heat of the retorts the next.

The locker rooms, washing facilities and toilet arrangements were crude and inadequate.

In the retort house at the Market street works, containing full depth benches, the cellars were practically without ventilation. The poorly burned off coke was dropped into these cellars, discharging large volumes of impenetrable smoke and gas, causing the worker severe distress. Men were overcome and there were many cases of painful accidents due to collision resulted from the wheeling of the hot coke through this atmosphere. As many as twenty-five men were overcome on one shift from heat and smoke in these works.

Under the United Gas Improvement Company's operation these conditions have received studious attention and been for the most part eliminated. The new retort houses have been designed by architects who have been advised by the engineers of the company as to the best methods of overcoming the defects noted. The design of the old retort houses, under municipal management, is shown in photograph 95, and of the retort houses built under company in photograph No. 417. The interior view in photograph No. 1468 will be referred to later.

The coke under the municipal operation was removed in small barrows pulled by men and dumped on a coke pile, as shown in photograph No. 216. The machinery for removing coke in large cars, hauled by cable, under the company's operation, is shown on photograph No. 980, outside view, and No. 981, cellar of retort house.

Accident Cases:

By reason of the varying forces controlling the management of employees under the municipal bureau, much injustice and inconvenience resulted in the treatment of accident cases. The number of accidents that occurred was very large. The men, untaught in this respect, were not of a sufficient average mental capacity to avoid exposing themselves unnecessarily to accidents. Foremen were not responsible in this regard for their men. It was not impressed upon the foremen that it was their duty, probably more urgent than any other, to see that their men were not liable to injury by reason of defective apparatus or lack of forethought in safeguarding. The treatment accorded in accident cases depended upon the political influence that could be brought to bear on the management. Some men when injured were retained on the pay roll at full time; others were dropped until they returned to work. There was no claim department, nor was there any means of obtaining damages except by legal process against the city. The engineering force authorized the adoption of apparatus in floor areas not suited for their operation. At Point Breeze works the charging and discharging machines, in their passage down the house, left only 9 inches between the walls of the building and the machine, and two men were killed by being caught and jammed in this narrow space. As the machine went down the house it was necessary for the men in its way to get out of the building and walk around to another door, or return through the same door after the machine had passed. Men's legs were broken, their ankle bones dislocated and a large number of minor painful injuries received through this method; yet afterward other houses were equipped in the same manner. Repeated accidents of the same kind did not lead to elimination of the causes.

There was no physician attached to the municipal plant, there was no one skilled or taught in the valuable rules of first aid to injured; there were no emergency kits for the dressing of slight wounds, inattention to which in this class of men is almost invariably followed by infection of disease; and the only report made of accidents was over the telephone to the chief of bureau. Failure to at once investigate an accident, by a regularly appointed physician or employee skilled in first aid to the injured, resulted in many cases in which doubt arose as to the extent of the injury or even as to the fact that any injury had occurred. It was claimed by the superintendents that many alleged injuries were fakes, and that through political influence men were kept on the pay roll as injured without any justification in fact. No money could be paid out of the city treasury except by ordinance of Councils stating definitely the purpose; hence there was no way for treating these accident cases except to drop an injured man from the pay roll or to pay him full time during disability.

Under the United Gas Improvement Company's operation, adequate means of giving relief, both physical and financial, are provided. A foreman is held responsible for the safety of his workmen, and some foremen have been reduced for failure to realize this responsibility. The cause of every accident is systematically inquired into, and means adopted to prevent a recurrence. An emergency kit is furnished in all works and stations, and special employees are on hand through the twenty-four hours who have been instructed by a practicing physician in the method of binding up wounds, treating burns and, to the extent of their knowledge, judging of the extent of an injury. Contributions made yearly to the various hospitals give, so far as the company can control, ready access to them. Practicing physicians are retained to visit the men injured. An accident report is at once sent to the claim department, a regularly organized branch of the company, which looks into every case of injury. The doctor visits the patient at once, and no injured man is sent to a hospital unless it is felt that the case is so urgent as to require more immediate attention or better facilities than can be had through the regular company physician. The company recognizes that while a man's earning capacity is temporarily gone, his living expenses continue. On the accident report blank that he fills out, the superintendent makes his recommendations as to the payment of wages in the case, and this is followed by a report from the claim department on the same subgineer of the result of its investigation. If the claim department, through the legal department's advice, decides that there is responsibility on the part of the company, it takes the case in its hands for settlement. If, in its judgment, there is no legal responsibility, a report is so made to the engineer of works, who, having before him the recommendation of the superintendent, then decides as to the matter of relief in the case. The physician retained by the company watches over every case until a cure is effected, and, with a few exceptions, the injured man is continued on the pay roll at three-quarters pay during period of disability up to six weeks. If there is no liability and the injured man does not recover within six weeks, the engineer of works makes a special report of the case to his superior officer, the third vice president, and receives instructions as to the final disposal of the case. Every accident of the slightest nature that can be known is reported, even where the man injured does not lose any time.

The company provides a ventilated locker for each employee. These lockers are distributed in rooms in all parts of the works, as conveniently as possible for the workmen. Hot and cold water are provided in sanitary washstands of generous size, and proper modern toilet facilities installed in well ventilated places. Shower baths are distributed around the works, and men employed as janitors to keep wash rooms, etc., clean and in order. These efforts are responded to in proper spirit by the workmen.

All cases of distress in the families of the workmen are investigated, and frequently financial relief has been expended to bridge over periods of sickness.

Under the municipal operation of the works, a Beneficial Society was formed by which money, raised by assessment of the members, was paid to the extent of $150 to next of kin on the death of an employee or his wife. This method has been enlarged upon by the company. The voluntary contributions of the workmen to their fellow members who have been incapacitated by sickness have in many cases been increased by donations from the company.

Under the United Gas Improvement Company's operation a club has been formed for the relaxation and pleasure of the employees. At the largest works a club house of good size has been erected and the grounds inclosed, graded and laid out for games. At the other works a large room has been set aside which, as well as the club house at the other works, has been equipped with pool tables, bowling alleys and the paraphernalia for other forms of amusement. The dues in this club are $2.50 per year. The membership averages between 500 and 600, being open to any employee of the company. The members and their families make constant use of the club. A room is available for smokers and has proven a source of great satisfaction. There was nothing of this kind under the municipal operation of the works.

Appointment of Salaried Employees

Under Municipal Operation.—The lack of adaptability of the laws and ordinances pertaining to the city government to the operation of the gas works is evidenced in the restrictions and unbusinesslike method of appointing and retaining salaried employees. The City Councils in their annual appropriations for the various bureaus and departments appropriate the specific amount to cover each salary for the year. As an illustration: The appropriations for the Bureau of Gas for the year 1895 contain, under table "H," item 1—Chief of bureau, $5,000; assistant chief and general store keeper, $3,000; general superintendent of distribution, $2,500; three superintendents of works, each $1,800; general foreman of distribution, $1,500; clerk and timekeeper at the Twenty-fifth Ward works, $1,000; nine telegraph operators, each $840; two Sunday watchmen, each $104; six assistant foremen of distribution, each $960. The total salaries of the bureau amounted to $191,288.

There could be no increase among these salaried employees except by a majority in Councils creating the proposed new position and naming the salary—a proceeding most difficult to carry out. Councils were not sufficiently informed regarding the gas works and its needs, and did not have sufficient faith in the operation of the works, to give support to a measure increasing any salary or creating new positions during the year. Where recommendations were presented to Councils in individual cases in the course of the year for increase in salary or for the creation of a new position, the not unwarranted suspicion arose that the suggestion was made through political motives rather than through the necessities of the business of the gas works, and were so frequently defeated as to discourage the attempt. In the same way, positions once established would not be abolished although their usefulness might have no longer existed.

It is also true that Councils did not look with favor on the appointment of men who had honestly earned a high reputation as gas engineers in the general field outside of the city. Councilmen did not desire the appointment of high salaried officials. As stated by one member of Councils who had served many years, Councils would prefer the appointment of five men at $1,000 each to do the work that could best be done by one man at $5,000 per year. A $1,000 per year berth under the city is eagerly sought for by a class of men who feel well rewarded by the appointment for their political allegiance.

This inelastic condition of the salaried positions at the municipal gas works led to some curious anomalies. Where it was absolutely necessary that an appointment should be made to a position not provided for by the annual appropriation, a man who was paid by the day, whose wages came under the classification of item 2 in the appropriation for the Bureau of Gas, namely, "Wages of stokers, helpers, mechanics, laborers and other employees engaged in the manufacture of gas," etc., would be selected for the position. As an illustration: A messenger, attached to the office of the chief of bureau and rated as a carpenter did not have a carpenter's tool in his hands for thirty-five years. Another: One of the principal employees in the Bureau of Gas, distribution department, acted as clerk. This misapplication of a man's title and labor was common in the works and led to considerable confusion, especially in attempting to get at cost figures, since labor would be charged in one direction when the men named were exclusively occupied in another.

Councils, having only remote connection with the gas works, were unable to judge of the merits of any particular case; Councilmen had no experience in the operation of the gas works; they were indifferent to the results obtained, and yet it is one of the fundamental principles of municipal government that Councils shall be elected by the people, and that they shall have the sole power of appropriating the funds of the city.

Under the United Gas Improvement Company's Operation—The executive committee of the company meets every week, when the list of salaried employees is susceptible of modification or increase. The engineer in charge of any department may recommend a change at any time to his superior officer, a member of the executive committee, and feel sure of obtaining action within ten days. The executive committee having the power to appropriate is composed of men who have gained their positions through their knowledge and ability in the business.

All labor must be classified in exact accordance with the work done, and as fully set forth in the large classification sheets and books provided by the company.

Observance of Laws Relating to Skilled Labor and Safeguards Against Accidents:

Under Municipal Operation—Ordinances and State laws have been passed from time to time defining the qualifications of men who may be permitted to perform certain classes of work, restricting the hours of labor and requiring the inspection and installation of safeguards.

Under the Bureau of Gas none of these ordinances or State laws received attention, and there was no penalty attached to the neglect.

The Bureau of Boiler Inspection is required by ordinance to examine and give certificates to all men who are permitted to fire or are in charge of boilers carrying more than fifteen pounds of steam or of over ten horse-power. No attention was paid at the works to this ordinance. Men would be put in charge of an engine who had no experience and could not have passed an examination; they were never required to. In one instance, a cobbler was suddenly given, through political preference, a position as engineer. In another case, a bartender found himself in charge of an engine. At all the holder stations the boilers were operated by unlicensed men, and there were no licensed men connected with any station.

By an act of State Legislature of July 26, 1897, which is as follows: Section 1—"Be it enacted, etc., That on and after the passage of this act eight hours out of the twenty-four of each day shall make and constitute a legal day's work for mechanics, workmen and laborers in the employ of the State or any municipal corporation therein, or otherwise engaged on public works," it would appear that the employes of the city should be confined to certain hours of labor. This is not the case. In many of the bureaus under the city at the present time complaint has been made that the men have scarcely time to sleep. In no case was more flagrant disregard of this act exhibited than in the recent administration of the police department under a Director of Public Safety. Under the city, buildings at the works were erected without having the plans submitted to the Bureau of Building Inspection. There was no inspection of elevators and no inspection by factory inspectors.

Under the United Gas Improvement Company's Operation.—An interpretation of the act of General Assembly amending the previous act and approved on the 18th of April, 1889, states: "That it shall be unlawful for any person or persons to have charge of or operate a steam boiler or steam engine in cities of the first class of this commonwealth, except locomotive boilers used in transportation and steam engines and steam boilers carrying less than fifteen pounds per square inch, unless such person or persons are upwards of 21 years of age, and holds a license as hereinafter provided for, and it shall be unlawful for any owner or owners, user or users, of any steam boiler or steam engine over ten horse-power, other than those excepted above, to operate or cause to be operated a steam boiler or steam engine without a duly licensed engineer." This is literally carried out by the company.

There is no boiler in the gas works that has not a licensed engineer operating it; not in charge of, but actually operating it. The company has been required to make radical changes in the steam plant to comply with this law. In the holder stations, at which there are no steam engines, the men who fire the boilers are licensed steam engineers.

The number of working hours per shift has, in almost every individual case, been reduced from what it was under the city. It was demonstrated that under the municipal operation the hours were dragged out to such a length as to impair the efficiency of the work done. The aim sought for under the company's operation is to make the hours of employment short and sharp.

In one case, at the Market street works, shortly after the beginning of the lease of the company, a rule was put into effect that the men should stay on the gas works property during the entire time of the shift. A man's wife in bringing his lunch to him fell into a hole and received injuries. The man brought a claim for damages on the ground that it was a hardship to him and his wife to be obliged to have his meals brought to him; that under the old circumstances he was accustomed to going home to dinner about 11:30 and not returning until about 3 o'clock. Shortly after the men were put on eight-hour shifts.

State and city authorities, such as factory and elevator inspectors, when calling at the works are met by the superintendent and personally shown about. Their suggestions and orders as to safeguards have been carefully noted and put into effect. The regular fee is charged and paid for these inspections.

The designs for all buildings are submitted to the city's Bureau of Building Inspection. This of course is not optional with the company, but the same law or laws which it obeys were entirely disregarded under municipal operation.

The experience of the United Gas Improvement Company's management is common to that of the managers of all power plants —that it is economy to have the best skilled labor both in control and in operating engines and boilers. The neglect of the municipal management, or rather the inability of the city management to obtain this class of labor, was quite evident upon an inspection of their engines and boilers. There was no apparatus at the works for heating and feed water. The injectors were of the crudest design and so inefficient as frequently to have no water showing in the gauge glass. Boilers were frequently burned out. In one instance, the boilers that were used to keep the holder cups from freezing, at the Twenty-fifth Ward works, were in charge of two men who knew nothing whatever about boiler firing and who were grossly intemperate. At times these boilers would be deserted for from six to eight hours during the night, the holder cups would freeze and the boilers would be burned.

In several cases the boilers, so badly incrusted as to require shutting down entirely for treatment to clean out the scale, were when cleaned out found to leak to such an extent that they had to be abandoned.

With such labor firing old cylindrical boilers with gas coke, the maximum of inefficiency appears to have been reached.

STATEMENT OF W. H. GARTLEY,

Formerly Engineer of

THE PHILADELPHIA GAS IMPROVEMENT COMPANY.

In the investigation of the Philadelphia Gas Works, under municipal operation, by the Senate of Pennsylvania's Investigating Committee, I am reported to have given testimony as follows:

Q. In the management of your works, are you bothered at all by political persuasion or importunity in the hiring of men?

A. No. We always have about a couple of hundred of applicants on hand and I usually find four or five waiting for me every morning.

Q. You mean seeking work?

A. Yes, and letters sent from Councilmen. Yes sir; we are over-run.

Q. How is it as to gratifying them?

A. Everybody that we need, we select from our list. We put them all on our list and select from our list.

Q. And you appoint as many as you have use for?

A. There is a certain class of men up there we do not pretend to give steady work to. We tell a man that we will give him such work as we have for three months, and after that he goes out whether he is a good man or a bad man. That is not done for anything except to be fair to all and to give all something to do. If you give that class of men three months' work, it helps the man along and he can work his credit along for awhile.

Q. In that way, you oblige as many Councilmen as you can?

A. In that way, we oblige as many as we can. We oblige them as often as we can. For instance, the Councilmen who live here? these are the ones who are most sought by these men seeking employment. The men who live near are the men who are most besieged by applicants and they interest themselves in the man no matter what his condition. If a Republican, they take him up naturally, and if a Democrat, they will want to convert him; but they are all taken up as they come. I never ask a man what he is.

The official report of my statements appears to be in the nature of a summary of a more extended questioning; as stated, it is somewhat vague and misleading. It is the truth, but not the whole truth, and as reported does not give the understanding that I believe the committee got from my statements. I am not reported to have said that we excluded from our application list all who were not sent by councilmen. I am not reported to have said that those sent by councilmen were appointed over the heads of other applicants, or were given any preference after being hired, or retained longer in our employ than the others. I am reported to have said that every man who applied was listed and we employed from that list in regular order, "as they came" on the list, and we did not ask any of them what their political affiliations were.

My attention was not called to the reports of that committee for several years after it was made, and I cannot now state, precisely the words used or the sequence of thought. I had no opportunity to examine the stenographer's report to see if I was correctly quoted. My memory, though, is clear enough to recall that I tried to show that among others we employed men sent us by councilmen.

In these industrial wards, the most important duty a councilman can perform for his constituents appeared to be to secure work for as many of them under the municipality as possible. During the years preceding this investigation, the condition of the mill workmen in Kensington and Richmond was far below normal. This is one of the largest manufacturing districts in the country, and thousands of men, women and children were deprived of work by the closing up of more than 50 per cent. of the mills.

The effort to get employment was constant and unremitting. Our rate of pay for laboring men was 15 cents per hour, and men would offer themselves for 12½ cents.

We had from twenty to forty men in the laboring gang, and it was arranged by the president of the company that in this unskilled class of labor, we could be of more assistance by dividing our work so as to give a man a chance to earn a living for three months, and then retire. During these three months he could look about for work at his regular vocation, and keep a roof over his head in the meantime. There were two classes of men who far more than any others, used their energies in helping these men find work—councilmen and priests; our list was filled largely through their efforts, and I specifically deny having given or having been instructed to give, by my superior officers, any special favors to councilmanic applications.

As a rule, the councilmen were fair and only asked us to treat their applicants with the same consideration that we did others. Our total number of employees of the unskilled class was too small to attract much of their time and energy. In the skilled labor, we made no changes for any political or philanthropic consideration. We never discharged a man at the request of a councilman or politician, nor excused poor work or infringement of rules because of political backing.

It was in these respects that we differed from the municipally operated gas plant. In the latter, there can be no question of the pernicious effect of political patronage on the discipline and efficiency of the employees.

Department of Distribution:

Framework of system employed, see Exhibit "A."

During the municipal operation of the gas works, the superintendent of distribution was for many years prior to the beginning of the lease to the United Gas Improvement Company, Joseph P. Boon. Mr. Boon was not an engineer by education or training. Originally a member of City Councils, he was appointed to this position of superintendent of distribution without any previous training under the Gas Bureau or in the gas business. He reported direct to Mr. Park, chief of bureau. While Mr. Boon had nominal charge of all the work of the Distribution Department, actually he devoted his time exclusively to the street main work. The work done in installing services, meters and the repair work of the Service and Meter Department, and such complaint work as was done by the Gas Bureau, received practically no attention from him. In the street main work his activities consisted principally in examining localities where houses were being built and streets were being paved, and deciding where mains were to be installed. Every morning the different street main foreman visited Mr. Boon's office at Twenty-second and Filbert streets, and received their orders for mains to be laid. For the great bulk of the street main work, Mr. Boon came into contact with the street main foreman only through these daily conferences. He rarely, if ever, visited the localities where the work was being done. An exception to this statement may be made with reference to the installation of the large mains, which was done under the foremanship of Mr. Cook. It is believed that Mr. Boon did occasionally visit the work of construction during the installation of large trunk mains, although even in this work his visits were infrequent.

The street main foremen who reported to Mr. Boon, as explained above, were as a rule practical street main men. Although unlettered, they had been promoted to their positions through long service as workmen. Most of them started as laborers, digging ditches in the streets, and then became calkers and pipe layers, and finally foremen. Their method of work, while primitive, was still in certain ways efficient. Their instructions usually embodied the size of the main, and the points to be joined by the new main, but the location in the street and all the details of getting around other underground structures were left to their judgment. The location of the gas main to which a new main was to join was not supplied to a foreman. He was dependent either on his memory for it or was compelled to find it by digging. There was no system in installing new mains, or in repairing leaks in mains and services, by which the foreman, who directed the digging of the holes had any information other than his memory regarding the location of what he was digging for. This of course, led to the digging of a great many unnecessary openings, with excessive cost of paving, although in those days there was not in the city a great area of asphalt paving, and the cost of replacing cobble stone and Belgian block paving in the manner in which it was done by the employees of the bureau was not large. These foremen had, of course, the power of discharge over the men working under them. The joints as a rule were well caulked, but there was little attempt to lay the main pipes in a straight line, and the methods were in many respects primitive. A large or trunk main laid joining two points (say) a mile apart would be joined to the existing main systems only at its ends. In other words, it would not be tied in with the main system at the cross streets. This lack of system in construction was quite common and perhaps often a case of oversight, it being the intention to have the local, or district street main foremen join the smaller mains to the large new one, but with the large main covered up and out of sight the matter was forgotten.

The tools used by the street main gangs were of primitive construction, often being homemade. In drilling holes in pipes containing gas, there were no tools to prevent the escape of gas in the face of the workman. Rubber bags for holding back the flow of gas in making cut-outs were used only in the larger mains, great risks being taken in mains of smaller size by making cut-outs and using nothing to stop the flow. As a rule, the foremen and the men were quite careless and indifferent regarding asphyxiation. While they had no instructions from a medical source regarding the bringing to of asphyxiated persons, yet they had inherited certain primitive methods, which they usually found sufficient.

There was nobody connected with the department who made any attempt to keep abreast with improvements in practice and what was being done by gas companies in other cities. All methods and tools were such as had come down from predecessors. All joints in mains were of lead, cement joints in no case being made. The foremen were not supplied with a well equipped wagon of "supplies," so that the methods of making intersecting joints, or going around obstructions, were not good. In numerous cases, the open ends of gas mains, temporarily stopped by means of taper wooden plugs, were covered up and left and forgotten.

The work of installing new service pipes and setting meters in new locations for the whole area of the city, except the three outlying districts of Manayunk, Germantown and Frankford, was under charge of James McCracken, whose office was at Juniper and Filbert streets, in the basement under the main gas office. Mr. McCracken was not an engineer, nor even a mechanic by education or experience. When his predecessor in the position of superintendent of shops died, Mr. McCracken, who was his clerk, was promoted to the position. He never went out of his office to inspect any work done by his men. As stated above, there was practically no superintendence of the work on the part of Mr. Boon or any one over him. He sent a written list of the services he installed to Mr. Boon's office. He did not have any assistants or inspectors to look after the work done by his men. The service gang consisted of two or sometimes of three men, who conveyed their tools and fittings by means of pushcarts. They came to the shop each morning to get their orders. Practically all of the services installed were three-quarter inch pipe; it was not coated to prevent corrosion; the joint at the gas main was made by means of an elbow, so that there was no allowance for expansion and contraction in the pipe. The service gangs extended the service pipe through the wall of a building so that it projected into the cellar in such shape that when the man came to set the meter there would be only one joint to make up. The methods of the Gas Bureau were such that there was practically no necessity of mechanics or men acquainted with the use of tools in the meter setting and complaint department. The bureau would set only one meter in one building, and consequently no headers, or pipes, to which several meters might be attached were installed. The meter was joined to the head of the service pipe by a lead pipe, made in the shop, requiring only one joint in making the connection.

The examination of complaints made by consumers was carried out by a force known as "out-order men." These were not mechanics. They carried a gas key for turning the cock at the curb and a pair of pipe tongs about twelve inches long. The orders and complaints issued to these men were written in a book with a stub. The order was torn out and given to the man, and the stub containing a record of the order retained. There was, however, no system of checking completed orders back with the stubs, so that if orders were lost or neglected, or unattended to, it was not discovered. There was no outside foreman or inspector to follow these men up to see that they did their work. The methods in this respect were extremely loose. What were known as "blind" orders were not uncommon. These were fictitious orders originated and entered in the order book by one of the men who wanted to take time off, and who would go out on it himself. It is believed also that many orders were issued in which the men did not reach the house of the consumer. As a rule, except for places very far distant, no transportation fare was allowed these "out-order men." They had often to walk three or four miles to attend to a complaint, on many of these trips carrying one or more gas meters, although, except in hurried cases, the gas meters were usually transported on wagons. Cases were not infrequent in which an "out-order man" would carry a twenty-light meter for a mile or more, set it, and carry the old meter back to the shop. The number of complaints received from consumers seems to have been astonishingly small. There were several reasons for this. In the first place, the employees of the bureau would not do anything in the consumer's house beyond the outlet of the meter. If the house pipes were leaking, or obstructed, or too small, or if the burners were in bad condition, it was the consumer's business to employ a plumber. Then, in cases where the trouble with the flow of gas was really within the province of the bureau work—that is, in the service pipe or meter—the remedies applied by the "out-order men" were on the average so inefficient that the consumers had learned by long experience that it was useless to complain. In case of a stopped service, the usual remedy was to pour hot water, or if that failed, benzine into the service pipe at the meter end. This practice had become common because of more or less frequent periodical cases of deposits of naphthalene in the service pipes. Practically no attempt was made to clear out solid obstructions. The use of Bell or service pumps was unknown. After the beginning of the gas lease to the company it was found that enormous numbers of service pipes were filled to a lesser or greater extent with solid obstructions, due apparently to an accumulation of rust, dirt and hard naphthalene, or carbon deposit. In many cases, the opening for the gas in the service pipe would not admit a lead pencil.

This failure on the part of the Gas Bureau to attend to any of a consumer's complaints regarding pipes beyond his meter and to insure a good flow of gas into his house, was one of the principal causes of the bad reputation of the city's management of the gas plant. This failure was due partly to the fact that mechanics were not employed to do the work, and still more to the lack of organization in the departments in charge. Especially in work of this kind, where the number of separate jobs is very enormous and where they are scattered all over the area of the city in the houses of the people, the whole matter of efficiency versus inefficiency depends on the organization—that is, on the systems of inspection over the workmen and their completed jobs and of checking up the orders issued with work done and of bringing together all the orders issued and the work done at a given house served with gas, so that all such orders may be intelligently edited and criticised in the office. The methods here described of the work in the complaint and service department were largely those of the main office at Juniper and Filbert streets, but with fair accuracy it may be said the same methods were followed at the offices of the outlying districts. It is possible that in one or two of these the degree of efficiency was higher than in the city. In at least one of the outlying districts, the main system was insufficient to maintain a proper pressure of gas throughout the district at the heaviest burning hours. The result of this was that practically every complaint from a consumer in the locality of an insufficient supply of gas was entirely ignored, because the employees of the bureau assumed that it as due to the general lack of pressure in the district.

Under the practice of the Gas Bureau, the cost of the service pipe for any length over sixteen feet was charged to the consumer, and as generally paid by the landlord. A charge was also made for the meter connection. When the meter had been set by the "out-order man" and attached to the service pipe by the lead inlet connection, the consumer employed a plumber to make the lead outlet connection and attach the meter to the house piping.

During the Lease of the Gas Works to the United Gas Improvement Company:

Framework of system employed, see Exhibit "A," schedule C.

The operation and maintenance of the Distribution Department is directed by the engineer of distribution, who reports to the third vice president.

The engineer of distribution, William J. Serrill, was graduated from the mechanical engineering department of the University of Pennsylvania. The assistant engineer of distribution, Walton Forstall, was graduated from the mechanical engineering department of the Lehigh University, and before his employment by the company had experience in operating the gas works at Lockport, N. Y.

The department was entirely reorganized by dividing the city into six districts, each in charge of a district superintendent. These district superintendents were selected because of their experience in the operation of distributing gas. In the city district, William H. Smith had many years of experience in manufacturing and distributing gas at one of the plants of the United Gas Improvement Company at Bayonne, N. J. In the Spring Garden district, F. M. Arthur had a similar experience at Reading, Pa. In the West Philadelphia district, Martin Molony had a similar experience in operating the gas works at Chester, Pa. In the Manayunk district, C. F. Hardick was in charge of the district for many years under the Gas Bureau and was retained in that position. In the Germantown district, W. A. Allison has been trained and promoted to this position since the lease of the gas works. He entered the employ of the company after being graduated at the Philadelphia Manual Training School in 1899, and has by a series of promotions reached his present position. In the Frankford district, Joseph S. Parker, likewise a graduate of the Manual Training School, has had a similar experience to Mr. Allison's.

These superintendents, each in his own district, maintain a well organized force of employees. There is a general foreman each for the office, for the main work, the service work, and the fitting work. The duties of these men are to follow up the workmen, visiting the premises where the work is done, either at the time or afterwards, and thus insuring the doing of the work and its well doing. In the office a continuous permanent record is kept for each house by card catalogue, so that all orders can be intelligently edited both before they are issued and after the workman makes his report.

The company undertakes to remedy, in most cases without charge, all the ills that the gas supply of a consumer can be subject to.

Since the beginning of the gas lease, the introduction of gas cooking ranges, gas water heaters, gas room heaters, and special appliances for use of gas in industrial purposes has enormously increased the activities of the department, and has required a class of mechanic's work and a degree of supervision that were undreamed of in the days of the Gas Bureau.

In the street work, the substitution of cement for lead in the joints of gas mains has greatly decreased the cost of installation and added to the general tightness of the joints. The workmen are equipped with the latest tools and devices both for facilitating the work and for self-protection. No man is sent to dig a hole in a street for purposes of installation or repair without being given definite information regarding the location of the particular pipe or joint he is to find. The making of additions or extensions to the main pipe system is now intelligently designed, being based on elaborate sets of pressures taken in the gas mains during gas burning hours. This practice was unknown to the Gas Bureau, which had very few pressure gauges, or none at all, in use on the distributing system.

In addition to the six district superintendents above described, the department employs also a superintendent of meters, who has charge of the purchase and maintenance of the stock of meters and operates a shop for repairing meters. The superintendent, W. A. Carter, was graduated from the Philadelphia Manual Training School, and entered the employ of the company in 1888. He has had a thorough experience in distribution work. The improvements introduced by the company since the beginning of the lease in the design and construction of gas meters are of great importance. Investigations conducted on a large scale have led to the supply of meters of much larger capacities and of greater accuracy of registration than those in use under the city bureau.

A superintendent of stores takes charge of all the materials purchased for the use of the department, and sees that it is properly disbursed and accounted for.

A superintendent of stables has charge of the appurtenances and the maintenance of the teams and of the general hauling work done by the company.

A superintendent of records maintains a force of engineers, who take the necessary measurements of the work that is done in the street and enter them in detail on permanent card records. Under the Gas Bureau no effort was made to keep any detailed record of the underground work. The fact that a main existed in any given street was shown by a simple line on a map of the city. Under the company, the record is detailed, sketches of all specials being made and exact locations taken so that in case any part of the system must be reached the place to dig can be obtained with precision.

The work of repaving over the trenches and holes made in the streets is in charge of a superintendent of paving, whose duty it is to look after the work done by the paving contractors, and to confer with the city inspectors and the chief of the Bureau of Highways on all questions that arise regarding the subject. In each district there are one or more paving inspectors who at periodical intervals visit the locations where the paving has been done by the contractors, so that in case any paving is poorly done, or sinks below its proper level, such conditions is found and reported.

The system of employment and promotion of employees in the Department of Distribution is the same as that described in the Department of Works. Each district superintendent has authority to discharge any man under him. All vacancies are filled by promoting men who have been in training for the positions, so that it is extremely unusual for the company to employ a trained man from the outside, putting him over the heads of old employees. In the Department of Distribution, the system is maintained of employing for important positions graduates from the engineering departments of the colleges, and training these men in the gas business. A constant force of about two dozen men of this type is thus maintained. These men, as they become experienced, are either put into responsible positions in the department or promoted to such positions in companies belonging to the United Gas Improvement Company system.

The remarks made under the description of the Works Department regarding the comfort of employees and the treatment of accident cases, with medical care and payment during sickness, etc., apply also to the distribution work. The employees of the Distribution Department are eligible to the advantages of the beneficial society and of the club already described.

Under the city management no meetings of the heads of different departments were held, in order to discuss the progress of the work. In the daily calls of the street main foremen on the superintendent of distribution, no meetings or discussions were held. Each foreman was given his work individually. As a result, there was no uniformity of practice. As noted above, there was absolutely no conference with the heads of departments in charge of meter, service and complaint work.

Under the company's management there has been, from the beginning, a series of weekly meetings of the superintendents. These meetings, which are held at the engineer of distribution's office, are attended not only by the district superintendents, but by other superintendents named above. The engineer of distribution presides and the assistant engineer of distribution serves as secretary. Copies of the minutes, as written, are sent to the superintendents, and serve as instructions to them in regulating their practice. At these meetings everything of interest to the department is brought up, and no changes in practice are decided on until after a discussion at a meeting. A large part of the time is taken up with the details of complaint work and other work in consumers' houses. Any unusual complaint or delay that may happen in one district is taken up and commented on generally, so that it may lead to some new precaution, or some change of practice, to prevent the occurrence of similar delay in any district. Accidents of all kinds are discussed. Samples of new tools or appliances as they come on the market are shown at the meetings and their merits discussed.

In the engineer of distribution's office a detailed and classified record is kept of all the work done in districts, so that each month a comparative report of costs may be made up and given to the superintendents. This report shows the number of jobs of a given kind attended to in each district and the cost per job. Such work as setting, resetting and removing meters, or connecting gas ranges, or attending to complaints of a certain character, are classified, the cost being charged to a separate account and the number of jobs kept, so that on these monthly reports the cost per job in each district is obtained. In this way, each district superintendent knows how his cost per job in all classes of work compares with that in the other districts and with the average. Wide discrepancies in these details, as between the districts, are each examined by a special engineer. He goes into the districts, follows up in detail any work questioned and makes a report as to the causes of the discrepancy. In this way the practice in the districts is kept uniform, and the work is carried on at the maximum of efficiency and economy.

The Department of Street Lighting (of the gas lamps) under the city was run as a separate bureau entirely independent of the Gas Bureau. The chief of the bureau was John J. Kirk. He maintained an office with two clerks at Twenty-second and Market streets. The city was divided into six lighting districts, in each of which was a district superintendent, who was required to furnish his own horse and wagon, the wagons being of the express wagon type with a cover. The duties of the six superintendents were principally the maintenance of the street lanterns and burners. They would carry out new lanterns, put them in place and return the old lanterns to a repair shop, which was run by the department at Twenty-third and Market streets. The superintendents would also renew street light burners where required. Theoretically, a superintendent was supposed to have charge of the lamp lighters in his own district, and to inspect their work. In practice, however, the lighters were all political appointees, and for the maintenance of their job looked wholly to the ward leader, so that the superintendents could maintain no real discipline. Moreover, as the superintendents were kept busy throughout the day making changes in lanterns and burners they argued that they could not be expected to work at night, too, and as a result they made practically no inspection of the lighters' work. If the latter failed in their duties of lighting and extinguishing on time, or if they failed to extinguish so that lights continued to burn in the daytime, such matters were usually reported by the Police Department.

In addition to the force of six district superintendents doing work on the street, there was also a service force. It consisted of four service men, each with a helper, and each having charge of a wagon belonging to the bureau. Each wagon had a driver, who would not do any of the work connected with the running of the services, or the erecting of the lamp posts, because he was hired only to drive. The pipe for the services, and the lamp posts were carried in the wagon, and the service man and his helper did the work of installing services and of erecting posts.

At the time of the transfer of the gas works to the United Gas Improvement Company there were 19,219 street lamps, and the Lighting Bureau employed 319 lighters, an average of about 60 lamps per man. A lighter carried a ladder, by which he climbed up by a post until he could light the burners with a match. No lighting torches were used. It was only in unusual cases when changes were made in the areas covered by the lighting sections. No attempt was made to rearrange the sections in order to equalize the number of lamps per lighter. As a result of this, lighters in certain sections of the city had very few lamps; some cases of not more than 35 lamps being known. In consequence other lighters had a greater number, and occasionally when this excess was complained of the chief would consult the director of public works, who would arrange to split that section in two and add another lighter to the force. With the lamp lighters the practice of hiring substitutes was very common. This practice was not authorized by the bureau, but on the other hand no active objection was made to it. The lighter received from the bureau a salary of $45 per month; he would hire some one at considerably less pay to do the work, and himself work at other employment. Cases are known where the lighters obtained work regularly as plumbers or plumbers' helpers at $2 per day. The bureau's attitude was that as long as the lamps were lighted and extinguished they did not care who did it.

When the company assumed charge of the street lighting work, it immediately discharged one-half the number of lamp lighters, reducing the force to 159 men. At the same time the sections were rearranged to equalize the work. This did not give the lighters each an equal number of lamps, as in different parts of the city local conditions and distances between lamps varied, making certain sections more difficult to take care of than others. The position of superintendent of street lighting was created, and under him were placed three ordinary inspectors of street lighting and a fourth as chief. The city was divided into three districts, one inspector to each. These inspectors, who have no duties except the discipline of the men and the inspection of their work, go on foot. An inspector sees every lamp in his section at night. These inspectors also break in a new lighter when the regular man is sick or has left his position. The chief inspector's duty is to spend every evening on the streets, making a general inspection of the condition of the lights as to size of flame, cleanliness, etc. He goes about in an automobile so that he can cover long distances each night and keep generally informed of the condition of the service. The superintendent of street lighting, to whom the inspectors report, is likewise expected to do a certain amount of personal inspection of the service in the evening.

Having started off with the reduced force of lighters, the company as rapidly as possible modified the bases of the street lanterns so that torches could be used in lighting and extinguishing the lamps, and as soon as the use of torches was begun there was a further reduction in the force of men, so that it consisted of 100 lighters. These men averaged nearly 200 lights each, and the schedule was arranged so that each man must walk briskly in order to cover his section in the required time. A longer time than formerly was thus taken in lighting and extinguishing, but the reduction in the cost of labor meant a large saving. Each man is required to clean his lamps once a week, and in very dusty weather, or on dusty streets, as much oftener as necessary. The Reppelye governor burner, which was in use under the bureau, has been continued, but the amount of light given by the lamps is now much greater than formerly, because of the rigid inspection and the immediate removal of any burner that shows a tendency to a small flame. This inspection and removal are necessary, as with use the Reppelye burner greatly reduces the flow of gas through it. As the bureau maintained no such inspection, the general average size of the flame under its management was small. Under the company's management the work of laying and renewing services to the lamps, erecting and taking down lamp posts, taking down and changing lanterns, putting on new burners, etc., was transferred to the regular distribution districts, above described. The orders for this work emanate from the superintendent of street lighting, and the actual work in the district is done by the regular service gangs. By this method a large saving is effected, the use of the four service groups being dispensed with.

DEALING WITH THE CONSUMER

Under Municipal Operation

The Bureau of Gas, which under the Department of Public Works had charge of the operation of the Philadelphia Gas Works, had offices at 1321 Filbert street, at which bills for the city, Kensington, Moyamensing, Southwark and West Philadelphia districts were paid. The Kensington, Moyamensing, Southwark and West Philadelphia districts required carfare to and return, varying from 10 to 16 cents, depending upon whether it was necessary to purchase an exchange ticket.

In the West Philadelphia district an office was open five days in the month. An office in the Bridesburg district was open for five days every three months, the bills for that district being rendered only every three months. The residents of that district, should they desire to pay their bills after the lapse of the five days, were obliged to go to Frankford, about two miles away; but with no street car lines for getting there directly, as all run in the direction of taking the residents to the centre of Philadelphia and back. If the residents of the Bridesburg district had been allowed to pay their bills at any other office of the Bureau of Gas, the inconvenience would not have been so great.

Offices were also located in the Spring Garden district (Broad street and Columbia avenue), and in Frankford, Germantown and Manayunk districts. In each of these districts the books for the district were kept and the bills rendered to its gas consumers. No consumer in any district could pay a bill in any other district. For instances, the office for the Manayunk district was on Main street, along the river front, and the district extended a considerable distance from that point, the residents more often visiting the central part of Philadelphia than the river neighborhood where the office was located. Nevertheless, no consumer of the Manayunk district, should he be down town shopping or for any other purpose, would be allowed to pay his bill at the main office at 1321 Filbert street; at whatever inconvenience, he had to pay it at the Manayunk office. So it was in all districts.

The personal convenience of the consumer was not taken into consideration in any way. The bills were delivered by the employee of the Gas Bureau at the residence of the consumer by being tucked under the door, whether the house was vacant or not. Should an occupant be absent for the day, or for a week or so, and no attention be paid to the bill, the gas would be shut off. The occupant on returning would be compelled to go through the formality of making an application and getting the owner's permission before the gas could be turned on.

Only complaints of an extreme nature were attended to. Long experience had instilled into the minds of the consumers that it would be useless to make any complaint such as is ordinarily made to-day to gas companies. Delays attendant upon ordinary complaints were such as to make the consumers feel that if they desired relief they must hire the services of a plumber rather than to wait during the long and tedious process of getting relief through the Gas Bureau.

Applicants for gas service had to apply at the office of the district in which they desired gas. A stranger moving to the city, occupying a house at which the former tenant consumed gas would find no indication as to what to do, or where to apply, or what forms it was necessary to comply with to obtain service.

The least possible amount of work was done by the Gas Bureau that could be to keep the consumers supplied with gas.

No attempt was made by the city to encourage the use of gas ranges or to assist in an intelligent understanding as to the proper way to operate them. If a consumer desired a gas range, he would purchase it on his own responsibility, without any knowledge as to whether it had been tested and found to be of economical design, and would be compelled to engage a plumber to make the connection. This cost from $12 to $20, depending upon the location in the house. As a consequence, practically no gas ranges were installed in the city.

Under the Company.

The United Gas Improvement Company at once allowed gas bills to be paid at any office where they were presented. It established an office in the heart of the Moyamensing, Southwark and Kensington districts, and kept the West Philadelphia office open all day and all night, the night force being there to receive orders and complaints, but not money. It connected all of the offices with a private telephone system and also the Bell system, and advertised the offices in the telephone directories and by slips sent with bills when delivered.

Bills are delivered by men in uniform with the company's badge. A bill man rings the door bell of a consumer and hands the bill to an adult occupant of the house or upon failure to obtain entrance, brings it back to the office and has it mailed to the address.

No shut-off is executed unless entrance is obtained to the house, or after inquiry of neighbors or adjacent stores the fact is established that the occupant has left, and even before it is then shut off a visit is paid to the real estate agent in charge, if he can be located, and permission asked to go into the house to turn off the gas.

Applications are taken at any office or at the residence of an applicant upon telephone or written notice that gas is wanted.

When a consumer has his gas turned off because of moving, a ticket is attached to a chandelier in a conspicuous place, informing any future occupant that the gas is off, and that it can be turned on upon application over the telephone or by person at any office. The ticket bears a list of the offices, locations and telephone numbers. Upon receipt of such notice a man is immediately despatched to take the application, and the gas is turned on without waiting to ascertain if the applicant is in arrears for a past bill. Of course, should this be the case, the gas is subsequently discontinued, unless the bill is paid.

Where the meter is set and an application is made before 2 o'clock P. M. on any day, the gas is turned on that day; if the meter is not on the premises it is set and gas turned on the following day.

Gas ranges are connected free on the first floor along the lines of mains. Capable demonstrators are on hand to go to any address and give instructions in the careful and economical use of ranges or other appliances. Water heaters attached to the boilers are installed free of expense to the consumer other than the cost of the gas appliance, which is fixed at a slight increase over the actual cost.

Complaints of all kinds are attended to promptly. Burners are given free, and on request put on fixtures.

Notes relating to table on pages 535 and 536.

[*] Note.—In comparing the column "No. of Men," under the Municipality and the Company, misleading deductions will be made unless careful examination of further facts, not here shown, are made.

The Company made, in 1906, about three times as much gas daily in these Works as was made by the Municipality in 1897, but the latter made about twice as much coal gas as the Company in 1906. The Municipality never made water gas, which formed a large proportion of the Company's make.

Some occupations given in the table, such as Stokers, refer solely to coal gas manufacture in which the municipality made twice as much daily as the Company; and other occupations, such as Blacksmiths, refer to the general works in which the Company's make was about three times the Municipality's.

The introduction of machinery and contracting for certain kinds of work in whole or part in some cases by the City and other cases by the Company will tend to confuse comparisons of "No. of Men" column.

[†] Note.—In items "d," "f" and "g" men are shown as working four hours per day; they made a full day, but worked only four hours at this occupation.

WAGES AND HOURS.

	1897—*Municipal.*			1905—*Company.*			1908—*Company.*		
	*No. of Men.**	*Hours per Day.*	*Rate per Hour.*	*No. of Men.**	*Hours per Day.*	*Rate per Hour.*	*No. of Men.**	*Hours per Day.*	*Rate per Hour.*
a Stokers	3	12	.27 1/12	3	8	.40	3	8	.40
	2	12	.25						
	151	12	.22 11/12	22	8	.31	20	8	.31
b Dampeners	7	12	.10½	6	8	.21½	6	8	.20½
c Flue Cleaners	10	12	.22 11/12	2	10	.25	1	10	.25
3d Purification Men	1	10	.22 11/12	2	12	.20	2	10	.24
	26	10	.25				1	4	.20
	3	10	.22½	1	10	.18½	1	10	.20½
	4	10	.20	1	2	.18½			
				1	12	.16½	1	10	.22½
							1	8	.22½
				[Laborers as needed]					
					9	.16½		9	.18½
e Coal Men	1	12	.22 11/12	19	10	.17½	15	9	.19½
	25	12	.18¾						
	6	12	.14 7/12						
f Charging and Discharging Mch. Men and Engine Men	31	12	.25	12	8	.27½	14	8	.27½
	9	12	.22 11/12	9	10	.27½	3	10	.30
				3	12	.25	1	4	.30
	5	12	.22 11/12	10	10	.25	4	10	.25
	5	12	.20 10/12	1	4	.25	3	8	.25
							3	4	.25
g Fitters	14	12	.18¾	2	12	.22½	2	10	.25
				2	10	.22½	2	10	.19½
				2	12	.17½	1	4	.19½
h Weighers	1	12	.20 10/12	1	10	.16½	1	9	.24
	1	12	.15½						

	1897—*Municipal.*			1905—*Company.*			1906—*Company.*		
	*No. of Men.**	*Hours per Day.*	*Rate per Hour.*	*No. of Men.**	*Hours per Day.*	*Rate per Hour.*	*No. of Men.**	*Hours per Day.*	*Rate per Hour.*
i Machinists	1	10	.32½	1	10	.30	1	9	.35½
	2	10	.30	2	10	.27½	1	9	.31
	1	10	.25	2	10	.25	4	9	.30
	3	10	.22	1	10	.22½	2	9	.27½
	5	10	.20				2	9	.20
k Blacksmiths	1	10	.37½	2	10	.30	1	9	.33
	4	10	.30	1	10	.27½	1	9	.30
	7	10	.22	2	10	.22½	1	9	.25
							1	9	.24
							1	9	.22
l Fitters	1	10	.30	2	10	.30	2	9	.35½
	7	10	.25	1	10	.27½	4	9	.30
	1	10	.22	3	10	.25	2	9	.27½
				2	10	.22½	1	9	.25
m Carpenters	1	10	.32½	3	10	.27½	2	9	.30
	3	10	.30						
	2	10	.17½						
n Bricklayers	1	10	.35	1	10	.36½	1	9	.40
	4	10	.30	1	10	.30	2	9	.27½
	4	10	.20	1	10	.25			
				1	10	.20			
o Yard Men	1	10	.27½	96	9	.16⅔	116	9	.18½
	37	10	.17½						
	1	10	.22						
p Ticket Puncher	1	10	.22	1	10	.22	1	10	.22
q Drivers	14	10	.17½	5	10	.17½	11	9	.19½
				8	10	.16⅔	9	9	.18½
r Valve and Hodler Men	1	12	.22½	1	10	.27½	1	10	.30
	2	12	.20 10/12	1	10	.25	2	10	.27½
				1	4	.25	1	10	.17½
s Coal Conveyor Men	4	12	.22 11/12	2	10	.25	2	10	.25

ENGINEERING MATTERS

United States Gas Works

(Schedule III)

By FREDERICK BURNETT and A. E. FORSTALL

II—CHARACTER OF SERVICE AND PLANT

H 1. Data for year ending:

Wheeling. For sixteen months ending April 30, 1906.

Atlanta. For year ending December 31, 1905.

Norfolk. For year ending December 31, 1905.

H 2. What process was used in making gas? If more than one, give approximate amount manufactured by each.

Wheeling. All coal gas, ordinary retort process.

Atlanta. Both coal gas and carburetted water gas are made, the amounts being:

	Uncorrected.	Corrected.
Coal gas	314,024,000	321,914,000
Carburetted water gas	190,136,000	179,577,000

Norfolk. The company made both coal gas and carburetted water gas, the amounts being:

Coal gas	84,584,000 cu. ft.
Carburetted water gas	100,627,000 cu. ft.

H 3. What process was used in purifying gas? If more than one, give approximate amount purified by each.

Wheeling. All dry lime.

Atlanta and *Norfolk.* Oxide of iron only in ordinary purifying boxes.

DESCRIPTION OF PLANTS

H 4. Coal Gas Works—generation:

Wheeling. (a) Twenty benches of 6's plain setting.

(b, c, d, e). benches of 's setting.

(f) Number of boilers. Two each 5 ft. diameter by 16 ft. long, with 24 3-inch tubes.

(g) Total H. P. Fifty (E.)

(h) Daily capacity. 750,000 feet.

Atlanta. (a) 18 benches of 9's regenerative setting full depth.

(b) Also arches for 4 benches of 9's regenerative setting, full depth, not filled.

(c, d, e) benches of 's setting.

(f) Number of boilers. Three.

(g) Total H. P. 375.

(h) Daily capacity. 1,440,000 feet.

Norfolk.

(a) Six benches of 6's, ½ depth setting, rear clinkering.

(b, c, d, e) benches of , setting.

(f) Number of boilers. One.

(g) Total H. P. 80.

(h) Daily capacity. 330,000 feet.

H 5. Carburetted water gas works—generation.

Wheeling. None.

Atlanta.

(a, b) Number of generating sets, 1; diameter, 8 feet 6 inches; height, 13 feet 3 inches; type, double superheater.

Lowe, base steam, built by United Gas Improvement Co.

(c, d) Number of generating sets, 1; diameter, ————; height, 13 feet 3 inches; type, twin generator double superheater, built by United Gas Improvement Co. Generators, 6 feet diameter, carburetter and superheater same size as in 8 feet 6 inch set.

(e) Total number of boilers; included in H 4 (f).

(f) Total H. P. Included in H 4 (g).

(g) Daily capacity, 1,400,000 cu. ft. total; 700,000 cu. ft. with one set in reserve.

Norfolk.

(a, b, c, d) Number of generating sets, 2; diameter, 7 feet 6 inches; height, ————; type, double superheater Lowe, with steam reversal.

(e) Total number of boilers. One.

(f) Total H. P. 125.

(g) Daily capacity. With both sets running, 1,300,000 feet; with one set in reserve, 650,000 cu.ft.

H 6. Purifying plant (including condensing and scrubbing).

Wheeling.

(a, b) Number of condensers, two; diameter, 4 feet; height, 24 feet each, with 110 2½-inch tubes.

(c) Number of washers, two; diameter, 9 feet; height, 5 sections; type, Kloenne.

(d) Number of scrubbers, ————; diameter, ————; length, ————; type, ————.

(e, f) Number of purifying boxes, four; dimensions, 18 feet by 22 feet by 3 feet 3 inches deep.

Atlanta.

(a) Number of condensers, 4; diameter, 6 feet; height, 23 feet for coal gas.

(b) Number of condensers, 1; diameter, 9 feet 6 inches; height, 22 feet for carburetted water gas.

(c) Number of scrubbers, 2; diameter, 6 feet; height, 23 feet; type, tower.

(d) Number of scrubbers, 1; diameter, 9 feet 6 inches; length, 13 feet; type, Mitchell rotary.

(e) Number of purifying boxes, 4; dimensions, 20 feet by 30 feet by 4 feet for coal gas.

(f) Number of purifying boxes, 4; dimensions, 15 feet by 15 feet by 5 feet for carburetted water gas.

(g) Also one tar scrubber, 3 feet diameter, 23 feet high, fitted with baffle plates.

(h) Also one hot scrubber, 6 feet diameter, 23 feet high, fitted with ordinary board trays.

(i) Also one naphthalene scrubber, 9 feet diameter, 28 feet high, filled with ordinary board trays in which gas is washed with gas oil.

Norfolk.

(a) Number of condensers, 2; diameter, 4 feet; height, 18 feet; 1, diameter 4 feet; height, 16 feet.

(b) Number of condensers, 1; diameter, 8 feet; height, 20 feet.

(c) Number of scrubbers, 2; diameter, 7 feet; height, 20 feet; type, tower.

(d) Number of scrubbers, 1; diameter, 6 feet; height, 20 feet; type, tower.

(e) Number of purifying boxes, 4; dimensions, 14 feet by 14 feet by 4 feet.

(f) Number of purifying boxes, 2; dimensions, 16 feet by 20 feet by 6 feet; also one Walker washer; dimensions, 6 feet by 8 feet by 6 feet 2 inches, and a shavings scrubber, 8 feet by 20 feet.

II 7. Holders. *Wheeling.*

(a) Number, 3.

(b) Types of tanks, and number of each. All have brick tanks.

(c) Number of lifts in each. One is single, and two are double lifts.

(d) Number of inlet and outlet pipes of each. Each has separate inlet and outlet.

(e) Capacity of each, 100,000 cubic feet, 200,000 cubic feet, and 450,000 cubic feet.

(f) Total capacity of all, 720,000 cubic feet.

All of the tanks need repairing at the water line, and the shell of the largest and newest holder will have to be practically renewstructed to make it tight. The shells of the other two holders are in good condition, as is also the guide framing of all holders.

Atlanta.

(a) Number, 4.

(b) Types of tanks, and number of each. Three brick tanks, and one steel tank.

(c) Number of lifts in each. Three, two lifts; and one, three lifts.

(d) Number of inlet and outlet pipes of each. Each has a separate inlet and outlet.

(e) Capacity of each, 120,000 cubic feet, 160,000 cubic feet, 380,000 cubic feet, and 1,144,000 cubic feet.

(f) Total capacity of all, 1,804,000 cubic feet.

Norfolk.

(a) Number, 3.

(b) Types of tanks, and number of each; two brick, one steel.

(c) Number of lifts in each, two.

(d) Number of inlet and outlet pipes of each. Separate inlet and outlet in each.

(e) Capacity of each, 70,000 cubic feet, 150,000 cubic feet, 300,000 cubic feet.

(f) Total capacity of all, 520,000 cubic feet.

DISTRIBUTION SYSTEMS.

H 8. Mains.

Wheeling.

Largest diameter, 16 inches; smallest, 2 inches; average, 4.59 inches. Total length (April 30, 1905) 163,592 feet, equal to 30.983 miles. All the mains are cast iron with lead joints, except part of the 2-inch, which is wrought iron with screw joints.

Atlanta.

Largest, 30 inches; smallest, 2 inches; average diameter, 5.66 inches; total length, 674,532 feet, equal to 127.75 miles. The mains are cast iron, bell and spigot pipe, with cement joints.

Norfolk.

Low pressure; largest diameter, 16 inches; smallest, 3 inches.

(c) Average diameter. The information as to the low pressure mains was not in such shape as to enable us to obtain the average diameter. Length of low pressure mains, 240,857 feet. The pipe is cast iron, bell and spigot lead jointed. Mains high pressure, largest diameter, 3 inches; smallest, 1¼ inches; average diameter, 1.61 inches. Total length high pressure mains, 42,872 feet. The high pressure pipe is wrought iron, screwed joints, extra heavy line pipe couplings. Total length of mains, low and high pressure, 283,729 feet, equal to 53.73 miles.

II 9. Meters.

Wheeling.

April 30, 1905, meters set, 5,219. In stock, 144. No prepayment.

Atlanta.

Total number of meters, 13,468; prepayment, 3,542.

Norfolk.

Total number of all meters December 31, 1905, 6,567; of prepayment meters, 1,744.

II 10. Services.

Wheeling.

The services are of wrought iron, uncoated, average length, (E.) 41 feet to 43 feet. There are no records as to the average length of services. We took off the lengths of one hundred and eleven services, as shown in the service charge book, and obtained the average length of these services at 41.5 feet, which we assumed as about the average for the whole system.

Atlanta.

The services are wrought iron, coated with Hollenberger's coating, average length (E.) 65 feet. The average length of the services laid in 1905 was 74 feet, but these were principally in the outlying portions of the city, where the houses were farther from the street than the average, and from the width of the streets, and the general distance of the houses from the curb, it seemed as if 65 feet would be the average length of all services.

Norfolk.

The services are wrought iron, coated with Hollenberger coating; average length as estimated by the superintendent, 50 feet.

II 11. Public lamps (streets, parks, etc.).

Wheeling.

(E.) There are no public lamps except five ordinary flat flame lamps located on dead ends of streets on the outskirts of the city, away from the electric street lamps. The city furnishes glassware and burners, but the lamps are supposed to be lighted and extinguished by citizens residing in the vicinity. No governors are used on the burners, and no inspection is made by the gas department, so the consumption per lamp and the number of hours lighted are uncertain. Apart from these five lamps, all street lighting is done by electricity.

Atlanta, Norfolk.

Have no public lighting whatever.

II 12. *Wheeling, Atlanta.*

Rent no stoves, heaters, engines or other apparatus mentioned in this question (12).

Norfolk.

Had on December 1, 1905, 338 stoves rented.

APPRAISAL OF PLANT.

H 13. As of April 30, 1905, and of fiscal period.

Wheeling.

	A.	B.	C.	D.
H14a. Lands (works).......	$50,000	....	$50,000	$50,000
15a. Buildings (works)....	39,900	$4,000	35,900	28,400
16. Coal gas benches.....	30,000	6,000	24,000	3,000
17. Boilers (coal gas)....	800	160	640	640
20. Exhausters and pumps	3,400	350	3,050	3,050
21. Condensers	2,950	150	2,800	2,800
22. Washers	5,350	1,350	4,000	4,000
23. Purifying boxes.......	11,500	1,150	10,350	10,350
24. Holders	87,450	10,900	76,550	76,550
Station meter........	2,800	560	2,240	2,240
Yard connections	2,100	....	2,100	2,100
Station governor	900	....	900	900
Sundry piping........	200	....	200	200
25. Street mains..........	86,800	31,000	74,600	74,600
27. Services (to curb)....	18,800			
26. Consumers' meters....	38,000	7,600	30,400	30,400
28. Public lamps owned..	75	....	75	75
29. Gas stoves, etc.......	....	....	....	....
30. Teams, tools, etc.....	3,300	....	3,300	3,300
Total without paving.	$384,325	$63,220	$321,105	$292,605
Paving over street mains....	52,900	....	52,900	52,900
Paving over services........	12,700	....	12,700	12,700
31. Total appraised value.	$449,925	$63,220	$386,705	$358,205

NOTE.—The figures in column "A" give the estimated cost of a plant which would be an exact duplicate of the present one, except that it would be new.

The figures in column "B" show the estimated cost of making the different parts of the present plant as good as new, without any alteration in the design.

The figures in column "C" are obtained by deducting those in column "B" from those in column "A," and represent the value of the plant as it now stands without taking into consideration the fact that parts of it are of an obsolete type, and very uneconomical in operation.

The figures in column "D" give the estimated value that the plant would have for a "person or corporation having a franchise in the town, and desiring to utilize that plant for the manufacture of gas, taking in the question of obsoleteness, and yet valuing the plant for what it is worth for gas making purposes."

H 13 to H 31, inclusive, omit for *Atlanta* and *Norfolk*.

CONSUMPTION.

H 32. Total number of services.

Wheeling. No record, estimated at 4,000.

Atlanta. (E) 13,700.

Norfolk. No record, estimated at 4,500.

H. 33. Total number of services metered.

Wheeling. No record, estimated at 3,950.

Atlanta. Estimated at 13,300. NOTE.—Atlanta H 32 and H 33. There are no records showing the total number of services, and the numbers given in these answers are based upon estimates obtained from officials of the distribution department as to the number of services on which there were more than one meter, and the number of services which were not in use.

Norfolk (H 33). No record, estimated at 4,500.

Norfolk H 32 and H 33, NOTE.—These estimates are based upon the number of consumers as shown by the books, and the probable number of unused services.

H 34. Percentage of services metered.

Wheeling. (E) 98.75.

Wheeling, H 32, 33 and 34, NOTE.—The estimates as to the total number of services, and the number of services metered, that is, the number of services to buildings in which an illuminating gas meter was set, are based upon information given by the secretary and the inspector of the gas works in reply to our inquiries as to the number of buildings in which more than one city gas meter was set, and the number of services not containing a gas meter. This information was confirmed by our observations during a drive around the city.

Atlanta. Percentage of services metered, (E) 97.

Norfolk, 97.8 per cent.

		Wheeling 16 Months' Period, Beginning Jan. 1, 1909.	*Atlanta*	*Norfolk.*
			Year	
		Cubic Feet.		
H 35.	Gas on hand at beginning of	473,000	1,241,300	230,000
H 36.	Gas made	212,972,000		198,895,000
	Uncorrected for temperature		344,130,000	
H 37.	Gas bought	¹3,005,000		
H 38.	Total amount to be accounted for	216,450,000		199,125,000
	Uncorrected for temperature		345,371,300	
H 39.	Gas lost by leakage (E)	50,501,800	45,[illegible]	28,[illegible]
H 39a.	Gas supplied free	¹2,039,400		
H 40.	Gas used at works and offices		2,017,000	1,400,000
	Including gas for the Arsenal engine (E)	¹1,070,000		
H 41.	Gas sold	162,[illegible]		168,[illegible]
	Uncorrected for temperature		296,[illegible]	
H 42.	Gas on hand at end of period	895,000	1,295,000	280,000
	Total	216,450,000	345,371,300	199,125,000

		Wheeling. 16 Months' Period, Beginning Jan. 1, 1904.	Atlanta.	Norfolk.
			Year.	
		Cubic Feet.		
H 43.	Total quantity sold for private lighting, by meter	162,515,000	(H 43, 44) 495,676,100	80,425,400
H 44.	Total quantity sold for cooking, heating, etc., by meter	[4]..........		73,641,500
H 45.	Total quantity sold for private lighting, unmetered	....	....	....
H 46.	Total quantity sold for cooking, heating, etc., unmetered	....	....	....
H 47.	Total quantity sold for public lamps, streets and parks, etc.	[5]..........	....	....
H 48.	Total quantity sold for public buildings, metered	[6]..........	....	....
H 49.	Total quantity sold for public buildings, unmetered	[6]..........	....	....
H 50.	Total quantity sold to other gas companies	....	....	[7] 8,635,300
H 51.	Total quantity sold	162,515,000	495,676,100	162,702,200

H 52. Maximum daily output.

H 53. Minimum daily output.

Wheeling. Maximum, December 24, 1904, 727,000 feet. Minimum, July 4, 1904, 208,000 feet.

---

[1] This does not appear upon the manufacturing records, but the accounts show that, during the period, natural gas to the value of $751.32 was purchased, and as the city does not use natural gas as fuel, and as meters and connections are in at the gas works, arranged so that natural gas can be passed into the holders, it is certain that this gas was so used. As the price to the city is 15 cents per 1,000 cu. ft., the amount given represents 5,009,000 cu. ft.

[2] This includes gas supplied by meter to various hospitals, engine houses, and market houses, and also the amount, not measured, estimated to have been used at the city hall. For details see printed "Statement of receipts and expenditures," etc., hereto appended—(No such exhibit submitted. E. A. M.)—in which the value of the individual quantities is given at a price of $1 per 1,000 cu. ft.

[3] This estimate is based upon observation of the number of burners in use at the gas works and the rate at which they appeared to be burning. The five street lamps are included on the basis of all night and every night lighting.

[4] (There is reference here to continuation of this answer which cannot be found. J. H. G.)

[5] None, except as in H 40, above.

[6] See H 39a and note.

[7] This gas is sold to the company supplying the Berkeley district, which is really part of the City Gas Company, being entirely owned by them.

Atlanta. Maximum, December 23, 1905, 2,177,000 feet. Minimum, July 2, 1905, 842,000 feet.

Norfolk. Maximum, December 16, 1905, 921,000 feet. Minimum, July 2, 1905, 317,000 feet.

II 54. Estimated population, January 1, 1906, on lines of pipe, that is, supplied by mains (consumers).

Wheeling. 39,000.

Atlanta. 93,000.

Norfolk. 46,200.

Note on Atlanta. (II 54). This estimate is based upon an estimate of the present population of Atlanta, given us by W. G. Cooper, the secretary of the Commercial association of that city, as follows:

Population by census of 1900	89,872
Number of new houses built since 1900, 4,795, multiplied by 5, equals	23,975
Population of additions annexed since 1900	2,000
Increase in number of people in hotels and flats	4,000
Total	119,847
From this we have subtracted the number of people living in the 3,900 houses shown by the insurance maps to be off the lines of mains. As these are practically all inhabited by negroes, we have assumed an average of 6.9 persons per house, or a total of	26,910
Leaving on the lines of mains	92,937

Note.—Norfolk, (II 54).

This estimate is based on a total population as shown by census taken in March, 1906, of 61,200, and of a population of 15,000 people living in the houses not on the lines of the mains. The number of these houses was counted from the insurance maps; the information as to which streets had gas mains being given by the street department foreman. These houses are practically all in the negro quarter, in which no gas pipes are laid.

II 55. Annual average consumption per capita on basis of inquiry II 54.

Wheeling. 2,877.

Atlanta. 2,339.

Norfolk. 3,459.

II 56. Population at last national census of area supplied.

Wheeling. 38,878.

Atlanta, city proper, 89,872.

Part since taken in, 2,000. Total, 91,872.

Norfolk. 51,612.

Note.—Norfolk (II 56). Population of Norfolk in 1900, 46,624. Population of Berkley, now included in Norfolk, 1900, 4,988. Total, 51,612.

H 57. Annual average consumption per capita on basis of inquiry H 56.

Wheeling. 2,937.

Atlanta. 5,424.

Norfolk. 3,152.

Note (H 54 to H 57) *Wheeling.*

The estimate of the population along the lines of mains January 1, 1906, is based upon the total population of 41,768, shown by the school census of 1905, as given us by Dr. Gray, and upon an estimate based upon observations made during the drive over the city, that there are 500 dwellings not reached by artificial gas mains. The United States census of 1900 shows an average of 5.5 persons per dwelling in Wheeling. So the 500 dwellings would represent 2,750 people, leaving practically 39,000 on the lines of mains. The amount of annual sales, 114,184,700 cubic feet, used in determining the annual average consumption per capita (questions H 55 and H 57) is that for the calendar year 1905.

H 58. Are consumers' meters removed and tested at regular intervals?

Wheeling. No.

Atlanta. Yes. Ten lights and over, every year; three lights and five lights, every three years.

Norfolk. Yes, once every five years.

H 59. If a consumer believes that the meter is fast, how may he have it tested?

Wheeling. Upon complaint of the consumer, the meter is taken out and tested.

Atlanta. On complaint of a consumer, meter is removed and consumer is given opportunity to see test made by company. If he is not satisfied with company's test, they will send meter to Washington for official test, expenses being borne by them, if the meter is fast and by consumer if it is correct or slow.

Norfolk. The company never refuses to test a meter when requested to do so by the consumer.

H 60. Are there records of proofs of meters as removed? If so, state them.

Wheeling. There are no regular records. When a meter is tested because of complaint, a slip showing the result of the test is sent into the office at the city hall, but there are no regular forms, and the slips are not kept.

Atlanta. The records of meter tests are put on cards by the foreman of meter shop, who delivers these cards to the office, when the records are copied from the cards into the record of tests book.

Norfolk. As the meters are tested, the results of the tests are entered in a book kept by the meter repairer. This book constitutes the only record of these tests.

H 61. What measures are being taken to extend the use of gas?

Wheeling. None.

Atlanta. By canvassing, and placing appliances in schools for use by classes in cooking.

Norfolk. The company employs three or four canvassers during the spring and summer months and gives lectures and demonstrations, also advertises in papers.

H 62. Are consumers instructed in the use of cooking, heating and other appliances?

H 63. What means are being taken to extend the use of stoves and other appliances?

H 64. Are cooking and other appliances carried in stock for sale or rent?

H 65. What methods are in use to secure new users?

Wheeling. Does not instruct consumers in the use of gas. Makes no attempt to extend the use of stoves and appliances, carries no cooking or other appliances for rent or sale, and uses no methods to obtain new users.

Atlanta. The fitters are taught how to use the various appliances and give instructions when fixing appliances and when attending to complaints. The company carries cooking and other appliances for sale and canvasses for users.

Norfolk. The company gives lectures and at intervals employs women to visit houses of consumers to instruct them in the use of gas ranges and cooking appliances. It canvasses and gives lectures and advertises to extend the use of stoves and appliances. Keeps new stoves for sale and second-hand ones for rent, and makes special efforts through architects, owners and builders to see that all new houses are piped and use gas.

QUALITY OF GAS.

H 66. Kind of gas supplied.

Wheeling. Supplies unenriched coal gas.

Atlanta. Supplies a mixture of coal and carburetted water gas, in the proportions of about two-thirds coal gas and one-third carburetted water gas.

Norfolk. Supplies a mixture of coal gas and carburetted water gas in about equal proportions.

H 67. If atmospheric air is mixed with the gas, state to what extent.

Wheeling. None is mixed intentionally, and as exhauster is run at level gauge, it is probable that none is drawn in.

Atlanta. To the extent of 1½ per cent. in the case of each kind of gas.

Norfolk. About 2 per cent. is added to the carburetted water gas only.

H 68. State fully the methods of testing candle power during the past year, giving place, time, frequency, distance from works, how published, etc.

Wheeling. No regular tests are made and there is no bar photometer. There is a Sugg type jet made by the American Meter company, at the city hall, but it is seldom used. Mr. Thompson, the superintendent, says he may have filled it up and observed the candle power three or four times during the sixteen months.

Atlanta. Tests are made, at the works only, on coal gas, carburetted water gas and mixed gas, the latter being taken from a main leading from the holder station about twelve hundred feet from the photometer room. Tests are made by the works clerk, and the night superintendent, at intervals of three hours, and the results are recorded in a book. No publication is made of them.

Norfolk. Candle power is tested at the works on a sixty-inch open bar photometer, using a flat flame burner for the gas, and an Edgerton standard. Tests are made once daily by works clerk or by superintendent. Standard is said to be standardized against candles every week. No publication of candle power, because no city inspection.

H 69. Summarize results of such examination.

Wheeling. No records kept.

Atlanta. The candle power records show monthly averages varying between the following limits:

Carburetted water gas, 20.56 to 28.69.
Coal gas, 14.76 to 18.89.
Mixed gas, 18.93 to 20.68.

Norfolk. The records show an average illuminating value of the mixed gas of 21 candles. See note to questions H 72, 73 and 74 for information as to the accuracy of these tests.

H 70. Kind of photometer used and method of testing.

Wheeling. Jet photometer of the Sugg type.

Atlanta. A sixty-inch open bar in a dark room using Leeson disc, Pentane lamp and number 7 Bray Slit-Union burner for the gas.

Norfolk. Sixty-inch open bar in dark room, using Edgerton standard.

H 71. Attach form on which tests are recorded.

Wheeling. No record made.

Atlanta. No special form used.

Norfolk. No special form. Entered in manufacturing book.

H 72. Maximum candle power for the year according to records.

H 73. Minimum candle power for the year according to records.

H 74. Average candle power at the works.

H 75. Average candle power at the consumer's meter.

H 76. Did the candle power fluctuate?

Wheeling. No records.

Atlanta. Maximum 25.46, average of one day.

Minimum 15.18, average of one day.

Average at the works, 19.63 candles for the year.

Average at consumer's meter not determined.

There was quite a variation from day to day.

Norfolk. Maximum candle power, 21½.

Minimum, 19½

Average at works, as shown by tests, about 21 candles.

No tests taken at consumer's meter. No fluctuation of candle power as shown by the records.

Note on *Norfolk.* (H 72, H 73, H 74) Candle power. These figures are higher than the facts warranted, because the rate of consumption was measured on the mistaken idea that to be correct the experimental meter should pass 1-10 of a cubic foot per revolution of the large hand, the correct figures being 1-12 of a cubic foot per revolution.

H 77. What was the average calorific value?

H 78. What was the average purity?

H 79. How was it tested for purity?

H 80. Does the plant employ a chemist and own a chemical laboratory?

H 81. Is there any record of any analyses of materials?

H 82. Are there any engineering tests or experiments being carried on?

Wheeling. There are no records of any tests (H 77, 78, 79). No chemical laboratory; no analyses of materials, and no engineering experiments being carried on.

Atlanta. Makes no calorific tests. The purity was not determined, as fas as sulphur compounds are concerned. The gas was free from H_2S and contained from three to six grains of NH_3 per hundred cubic feet. The only tests made are for sulphuretted hydrogen with acetate of lead paper, and with the Tutwiler test, and for ammonia with the test used in Massachusetts by the state gas inspector. The company maintains no chemist and no regular laboratory, but there are gas anaylsis, tar and oil distillation, and ammoniacal liquor distillation apparatus used by the assistant superintendents from time to time. There are no records of analysis of materials. A series of tests have been made during the past year to determine the kind of oil that gives the best results in absorbing napthalene from the gas to prevent it from being deposited in the distribution system.

Norfolk. No tests made for calorific value or purity, except acetate of lead tests at outlet of next to the last purifying box. The company employs no chemists, has no chemical laboratory, has no records of anaylsis of material, and is carrying on no engineering experiments.

PRESSURE.

H 83. State how pressure was measured and recorded.

Wheeling. Measured by U gauges, but no records kept.

Atlanta. Pressure is measured and recorded daily by Bristol gauges, one at the works, one at the office, and two that are kept out on the district, but not in any fixed places, being moved around as occasion demands. In addition, at the time of maximum demand in December, pressures are taken at a number of different points, with U gauges, and these pressures are recorded in reports to the general manager.

Norfolk. The street main pressures were measured only at the outlet of the governor at the works. The pressures at that point were recorded by a Bristol recording gauge, the charts from which are kept on file.

H 84. Summarize records for past year.

Wheeling. No records.

Atlanta. The records for the past year show the pressure at the time of maximum consumption in December to have been good over most of the city, but at three points at the extreme ends of districts the pressure was below 12/10 of an inch, at other times of the year the pressures were all above 15/10, except at the lowest point in the city, where it ran down to 11/10. Some mains have already been laid, and others are planned, to increase the pressure at these low points.

Norfolk. The records for the past year show that the pressure ran quite uniformly about 18/10 from one to five A. M., from 23/10 to 25/10 during the day, and 28/10 during the evening, these pressures being regulated by a Connelly automatic governor.

H 85. Were pressures fairly uniform?

H 86. What was the highest pressure recorded?

H 87. What was the lowest pressure recorded?

H 88. What was the difference between day and night pressures?

Wheeling. Pressures were fairly uniform, except in the portion of the city south of Wheeling Creek, and on the Island. No records of highest or lowest pressure. Difference between day and night pressures: 7/10 of an inch, day pressure; 19/10 night pressure; 26/10 at the works.

Atlanta. Pressures fairly uniform. Highest at works, 56/10 inch. Lowest recorded, 10.5/10 at Capitol avenue and Ormond. During the hours of daylight the governor pressure is about 30/10 of an inch. During the hours of heavy consumption the governor pressure was 55/10 of an inch during November and the early part of December; but has been only 48/10 to 50/10 since the completion of a new 16-inch main. From midnight to daylight the governor pressure is 28/10 of an inch.

Norfolk. Answered under H 83 and 84, except for H 88 (difference between day and night pressures) 10/10 inch.

H 89. What was the pressure at the works?

H 90. What was the average pressure at the consumer's meter?

H 91. Were complaints numerous as to pressure?

H 82. Were there frequent complaints about interruption of service?

H 93. Has the gas supply ever been cut off from the city? Describe instances.

Wheeling. No records of pressure at works, or consumer's meter. Numerous complaints as to pressure from the southern portions of the city and the Island. No complaint records are kept. There were said not to be many such complaints since Monongah coal has been used. The gas has been cut off from the city but once, when the works were flooded in 1884.

Atlanta. Average pressure at works, in summer, about 30/10 inch; in winter about 32/10. Estimated pressure at consumer's meter between 25/10 and 30/10. There were numerous complaints from two districts, to which larger mains are being laid, but over most of the city there is no trouble from lack of pressure.

Number and distribution of complaints and orders during 1905. Poor pressure complaints.

Naphthaline	5,544
Water in service	408
Rust in service	1,575
Thawed out service	330
Thawed out meter	231
Water in meter	139
Trouble, house pipes	351
Total	8,578

Other complaints and orders.

Leak inlet connections	364
Leak outlet connections	240
Leak in meter	379
Leak in service	165
New burners and tips	457
Repaired fixtures	1,272
Preparyment part of meter	9
House pipe inspection	1,028
Indexes taken	1,052
Gas found O. K.	2,058
Various	1,314
Duplicate orders	1,494
Total	18,410

The gas has not been cut off during the last 17 years. No definite knowledge as to conditions prior to that period; but it is thought that gas has never been off over the whole city at any time.

Norfolk. See H 84. There is no information as to pressure at consumer's meter. There were no complaints of general low pressure over a whole district, but there were a number of complaints of poor pressure in individual cases due to frozen services, meters, etc.

The number of "poor pressure" complaints due to various causes during 1905 were as follows:

Services frozen	154
Meters frozen	135
Services stopped for various causes	818
Water in meters	97
Services requiring relaying	10
Poor gas, not otherwise explained	17
Total	1,231
Mains trapped	11
	1,242

The number of services and meters frozen was abnormal, owing to the abnormal temperature conditions during January and February, 1905. There was no general interruption of service. The gas supply has never been cut off from the city since the works started.

EXTENSIONS.

H 94. What factors have determined the extent and location of extensions?

Wheeling. There have been no extensions of any consequence, so it cannot be said what factors would have determined their extent and location.

Atlanta. Extensions have been made wherever the prospects seemed good for business, the company being willing to lay one hundred feet of four-inch main for each consumer.

Norfolk. Extensions have been made wherever the prospect seemed good for business, the company being willing to lay one hundred feet of main for each consumer.

H 95. Is the built-up area well served, so that all citizens may use the service?

H 96. Has the policy in respect to extensions been liberal?

H 97. Total length of extensions during the past year.

H 98. Have the citizens of any section petitioned for extension to their district within the last five years?

Wheeling. The built-up area is well served. The policy in respect to extensions has not been liberal in recent years. Total length of extensions (16 months), about 230 to 250 feet of four-inch pipe. There have been no petitions for extensions to new districts within the last five years.

Atlanta. The built-up area, except the area occupied exclusively by negroes, is well served. The policy in regard to extensions, liberal. Length of extensions during the past year, 4.88 miles, equal to 25,793 feet.

There have been no petitions for extensions, except from districts far beyond the city limits.

Norfolk. The area occupied by whites is well served, but no pipes are laid in the negro quarter. The policy in regard to extensions has been liberal. Length of extensions during the past year; low pressure, 24,620 feet; high pressure, 9,886 feet. There has been no need of any petition for extensions within the last five years.

H 99. As between several sections petitioning at one time, how were extensions determined and in what order?

H 100. Were extensions made promptly when there was a demand?

H 101. Was every applicant for service able to get it promptly?

H 102. Has the necessity for passage of an ordinance ever caused delay in extending the service?

H 103. Has service been extended in advance of the demand in order to stimulate the growth of a district, or has it awaited demand?

H 104. Was the department free to use its judgment about extensions, or was an ordinance required authorizing the extensions?

H 105. May service be extended to suburban sections not within the city limits? State fully the conditions upon which this may be done.

Wheeling. No case of contemporaneous or conflicting petitions has arisen in recent years. There has been no demand for extensions in recent years, and every applicant along the line of present mains has been served promptly. No ordinance is required for pipe extensions. Extensions have not been made in advance of demand. The department was free to use its own judgment about extensions. For the right to extend mains beyond the city limits see schedule number 1 by Dr. Gray.

Atlanta. There have been no petitions from localities that could be profitably reached. Extensions have been made promptly when there was a demand, and applicants within reach of the mains have got their service promptly. Mains have been laid in advance of new pavement, but not otherwise in advance of the demand, unless the company receives a bonus of 10 per cent. of the cost of the extensions. The company has no franchise rights outside of the city as it may be extended, but it has extended its mains outside the city limits under permission from the commissioner of roads, and in several directions, as the territory built up. These extensions are not of any great length, and the territory will probably ultimately be taken into the city.

Norfolk. In case of conflicting petitions the relative amounts of business offered would govern, if such cases arose. Extensions have been made promptly when the business warranted the extension, and applicants have been promptly served. Extensions have awaited demand. The company's charter covers the whole county of Norfolk. Therefore service may be extended to suburbs and the adjoining towns.

STREET WORK.

H 106. Was street work done by direct employment or contract?

H 107. Was the work done by contract properly inspected?

H 108. Was the work performed in an efficient manner?

H 109. Was the street surface promptly restored after openings were made?

H 110. Was water used in puddling ditches?

H 111. Were open trenches and obstructions properly guarded?

H 112. How were sunken trenches taken care of?

Wheeling. Street work done by direct employment. We have no means of judging as to quality, but the cost of service work as now done is excessive. The street surface was promptly restored as far as (we) were able to ascertain. Occasionally water was used for puddling ditches. Trenches and obstructions were properly guarded as far as we were able to ascertain. Sunken trenches were taken care of partly by department of public works and partly by gas department.

Atlanta. Street work is done efficiently, but by direct employment only. The office of the board of works reported that the company attended to restoring the street service very promptly. Water is not used for puddling ditches, as it is not approved by the commissioner of public works. Trenches and obstructions were properly guarded (board of works). After the ditches on paved streets have been filled, the board of works are notified and they attend to the repaving, and are responsible for any settling, all repaving being charged to the gas company. On unpaved streets gas company looks after sunken trenches.

Norfolk. Street work is done efficiently and by direct employment only. According to the city engineer the street surface was promptly restored when opened, and trenches and obstructions were properly guarded. The nature of the soil renders it unnecessary to use water in puddling ditches. In case of sunken trenches the city engineer notifies the company to repair, and the company does so as often as is required to restore roadbed or pavement to as near its original condition as is practicable.

H 113. What was the policy in regard to improving the condition of street services prior to street paving or repaving?

Wheeling. There has been no regular system of overhauling services ahead of new paving, but new services are put in if there seems any chance of getting consumption within a year or two.

Atlanta. The pipes are overhauled in advance of paving, and all services are renewed or put in good condition.

Norfolk. The company has made a practice of overhauling mains and services in advance of paving or repaving.

H 114. Is there an up to date map showing the location and nature of all street mains and fixtures?

Wheeling. No.

Atlanta. No; there is a map showing the street mains, but it does not show location in the street, nor does it show any of the fixtures.

Norfolk. None at present, but one is being made.

H 115. Who decides where underground structures shall be located in the street?

H 116. Is a permit from a public authority required before street may be opened?

H 117. Is a separate permit obtained for each opening?

Wheeling. A permit is required before the street may be opened, and is obtained for each opening. There are no regulations as to the location of underground structures in the streets.

Atlanta. Permits are not required, but are taken out as a matter of courtesy; generally a separate one for each opening, but at times general permits covering whole streets are taken out; for instance, when searching for leaks. In regard to underground structures as far as gas pipes are concerned, the company decides, except for a verbal agreement with the water department that as far as possible the gas pipes shall be laid on the south and east sides of the streets.

Norfolk. Permits are not required by law, but as a matter of courtesy they are taken out, a separate one for each opening. The company can put its mains in the streets where it pleases.

PURCHASE OF SUPPLIES.

H 118. Who places the orders for material, and who governs the placing of orders?

Wheeling. Small orders are placed by the superintendent, large ones by the trustees.

Atlanta. The purchasing agent and the superintendents of departments, all orders being reported to the general manager.

Norfolk. Orders are placed by general manager or assistant manager on requisitions from various departments.

H 119. Were contracts advertised?

Wheeling. Not publicly.

Atlanta, Norfolk. No.

H 120. What system was used to check quality of materials and weights or measurements of shipments?

Wheeling. All supplies are weighed on wagon scales as received, and measured and checked by the superintendent.

Atlanta. All materials are weighed, measured or counted, and inspected by the store keepers, who in this way check the invoices and report as to discrepancies.

Norfolk. All goods received are inspected and checked by store room keepers.

H 121. What redress is there in case of shortages or poor quality of shipments?

Wheeling. Deductions from bills are made for shortages; the poor materials are returned.

Atlanta. The proper deductions are made from the bills, or else the next order is placed with another dealer.

Norfolk. Deductions are made from the bills, unless shortage in quantity or quality is made good.

H 122. How do prices and quality compare with those paid by private companies?

Wheeling. Sundry supplies are purchased at the same prices as are paid by private companies, except that same are purchased at retail instead of wholesale. The price paid for coal seems reasonable.

Atlanta, Norfolk. ———

H 123. Were the dealers supplying materials connected with city, county or state government?

Wheeling. No.

Atlanta, Norfolk. ———

H 124. Were local dealers favored over those outside of the city?

Wheeling. No.

Atlanta, Norfolk. Yes, prices being equal.

H 125. Was there delay in placing orders after the engineer or superintendent expressed the necessity for the supplies?

H 126. In practice did the manager get the types and makes of things he asked for, or was he forced to take something else?

H 127. Were bills for materials purchased paid promptly?

Wheeling, Atlanta and Norfolk. There was no delay in placing orders for ordinary supplies, which the manager gets of the types he asks for, all of which are paid for promptly.

GENERAL MATTERS.

H 128. Is the plant adequately equipped to handle the business?

Wheeling. So far as manufacturing capacity is concerned, the plant is adequate for the present business, but there is no provision for increase.

Atlanta. Yes; everything is adequate for present demands.

Norfolk. The plant is adequate so far as generating capacity is concerned, but there should be additional coal gas scrubbing apparatus and additional holder capacity, since present holder capacity is only 63 per cent. of the maximum day's send-out, and it should be at least 75 per cent. under the conditions obtaining there

H 129. Is the equipment of modern and efficient type?

Wheeling. No. The benches and bench equipment are of a type that should not be found in plants of this size. There should also be a scrubber. Otherwise the equipment is fairly efficient.

Atlanta. The equipment is of a modern and efficient type except for the base steam carburetted water gas set, which is to be remodeled during the coming summer.

Norfolk. Yes.

H 130. Is it in good condition?

Wheeling. The skeletons of the stacks of benches and the iron work of the benches are in poor condition. The largest holder is also in poor condition. Otherwise the apparatus is in fair condition.

Atlanta. Yes, it is kept in very good condition.

Norfolk. Yes.

H 131. Will it be necessary to make extensive repairs or alterations in the near future?

Wheeling. The plant can take care of the present business without any extensive repairs, but it is very uneconomical, and if economy is to be secured, the benches should be replaced by another type, and extensive repairs made to the large holder.

Atlanta. No. Only ordinary current repairs will be required.

Norfolk. No.

H 132. Is the plant kept in clean and neat condition?

Wheeling. No.

Atlanta and *Norfolk.* Yes.

H 133. Are the works adequately ventilated?

Wheeling and *Atlanta.* Yes.

Norfolk. Yes, except that retort house louvre should be higher.

H 134. Are the pits, shafts and machinery properly guarded?

Wheeling and *Atlanta.* Yes.

Norfolk. Yes, though engine room is rather crowded.

H 135. Are the offices for payments, complaints and other business conveniently located?

Wheeling. Fairly so.

Atlanta. Yes.

Norfolk. Yes.

H 136. Were consumers' complaints promptly and efficiently attended to?

Wheeling. The complaints seem to be promptly attended to, but there are many repeated complaints from the same houses, so the efficiency is not good.

Atlanta. Yes.

Norfolk. Yes, although there is no consumers' record to show whether the same complaints recur from the same house.

H 137. Describe office system of handling complaints.

Wheeling. When complaints are received they are entered on pad paper, and the complaint men enter them into their call books from these slips, which are then destroyed. No further record is kept at the office of the complaints. The call books do not show what was done to remedy the trouble, except when the meter is changed, and these books are not preserved, so it is impossible to give the number of complaints for any given periods. The secretary, Mr. Schenk, said that he thought they averaged about 20 per day during the winter and 10 per day during the summer.

Atlanta. When a complaint is received, original and carbon duplicate cards are made out. The original is turned over to the jobbing department and given to the fitter detailed to attend to the complaint, while the duplicate is retained in the office. The fitter, after attending to the trouble, fills out the card to show the cause for and the means adopted to remedy the trouble, and returns it to the office. It is then filed by street and number, and the duplicate is destroyed.

Norfolk. When complaint is received, it is entered on regular forms, consecutively numbered. The filled-out form is placed on a file, from which it is taken by the jobber, who next comes into the office after it is filed, and he proceeds to attend to it. The jobber enters on the original form the cause of trouble and what was done to remedy it, and hands the form, signed by him, to the foreman of jobbers, who stamps it to show that he has noted it, and it is then filed for future reference. No duplicates nor stubs are filled out; the only check upon attention to all complaints being by seeing that there is no break in the numbers of the forms as filed.

H 137a. How are leak complaints attended to at night?

Wheeling. By calling up the gas works, from which the superintendent is notified, and he either takes care of the leak himself or notifies the inspector to do so.

Atlanta. The repair shop is open until 9 P. M. After that, consumers are instructed to telephone to superintendent of distribution, who attends personally to complaints.

Norfolk. The telephone exchange in office is kept open during winter months until 7 P. M. After that hour complaints are made to either the manager or superintendent, who notify the foreman of jobbers, who attends to all night calls.

H 138. Is there a system of badging or uniforming the employees so that they may be known to the public.

Wheeling. No.

Atlanta. All employees on outside work, bringing them into contact with the public, wear badges and a cap bearing the name of the company and the employee's number

Norfolk. All employees dealing with the public have numbered badges, but not uniforms.

H 139. Are the general morale and discipline of the employees good, bad or indifferent?

Wheeling. The superintendent has not the power of appointment and removal, and as a result the discipline of the employees is indifferent.

Atlanta and *Norfolk.* Good.

H 140 and H 141. In all three of the undertakings the employees who meet the public are neatly dressed, polite and attentive.

H 142. Do the various departments work in harmony? Is there friction or jealousy, and does one department shirk work, leaving it to be done by another?

Wheeling. The various departments appear to work in harmony, and no department is called upon to do the work of any of the others.

Atlanta. They work in harmony, and there is no friction.

Norfolk. All departments appear to work in harmony, and employees pay strict attention to the work of the various departments.

H 143. Is there an adequate system of telephones?

Wheeling. There are telephones at the office, at the works, and at the house of the superintendent and inspector.

Atlanta. Yes, there is a very complete system.

Norfolk. At office, at works, at residences of general manager, assistant manager, superintendent, foreman gas works, and foreman outside.

H 144. Are the works and offices properly watched at night?

Wheeling. There is no one at the office at night, and no regular watchman at the works, but the engineer is supposed to patrol the holder yard.

Atlanta. The system of reports requires regular visits to all parts of the works, and there are two men at the office all night.

Norfolk. Retort house men watch works. Private detective agency makes hourly visit to office, and his visits are checked by a time-recording watchman's clock.

H 145. Are employees generally permitted to run to fires, or is some one appointed to go?

Wheeling. The street gang is instructed to look out for fires.

Atlanta. Each man in the distribution department has a district to which he attends at night. In the day time a special man is sent out from the office upon alarms.

Norfolk. The foreman of the stove department looks after fires, and the fire department notifies him of all fires during the night.

H 146. Is there any system of inspection to prevent workmen of other companies or city departments from injuring the underground structures?

Wheeling. No.

Atlanta. All employees are required to report any work observed by them, and all permits issued by the city are noted and the work done under them is inspected.

Norfolk. No system of patrol, but keep watch of work done by other companies when it is known that they are at work.

H 147. Has the manager maintained an adequate system of reports made to him of the details of the operation of the plant day by day, so as to show manufacturing results, cost per unit, length of underground or overhead structures instaled, etc.?

Wheeling. There is no general manager. Reports are made of the coal used, gas made, and gas sent out, but no other daily reports are made.

Atlanta. Yes; the manager receives each day reports from the works, and from all work done by the distribution department.

Norfolk. Although complete records are kept at works and office, reports are not made daily to the manager, all reports being made monthly.

H 148. Attach the form on which the manufacturing records are kept.

Wheeling. Form attached, q. v.

Atlanta. We were unable to get a copy of this form, but it is the regular United Gas Improvement company form.

Norfolk. It was impossible to secure this form.

H 149. Was there a drafting room maintained?

Wheeling. What little drafting is required is done in the city engineer's office, and not charged for.

Atlanta. Yes; one at works, and one at office. The engineers do the drafting.

Norfolk. No.

H 150. What system was in vogue to take care of the tools distributed to employees?

Wheeling. None. Men are merely given tools as they call for them.

Atlanta. All the tools used are issued from the storeroom and charged against the individual or the gang receiving them, and have to be returned or definitely accounted for.

Norfolk. Tools are given out by storeroom keeper and charged against the person receiving them, who is held responsible for their return.

H 151. Were the different classes of workmen equipped with proper tools? Were the tools kept in order?

Wheeling. The equipment is fairly good, and the tools are kept repaired and in good order.

Atlanta. Yes.

Norfolk. Yes, to both.

H 152. With what promptness were orders to turn on gas attended to?

Wheeling. All such orders are attended to on the day on which they are received, or else on the next day.

Atlanta. All orders of this kind are attended to either on the day on which they are received, or on the next day.

Norfolk. Very promptly; usually on the same day as received.

H 153. Are service pipes run to every lot whether built upon or not, prior to street paving or repaving? If so, how many of these dead services are now in existence?

Wheeling. There are practically no such services run, and there is nothing to show whether there are any now in existence.

Atlanta. Yes. The officials of the distribution department estimate the number now in existence at about 500.

Norfolk. Yes. No record, but not very many, since most of the streets were well taken care of before the pavements were laid.

H 154. Are records kept of services by date installed, so that as the service grows old an inspection may be made at intervals of years to determine when renewals should take place and insure such renewal before most of the services have begun to give trouble?

Wheeling. No.

Atlanta. Cards giving information as to the dates are filed by streets and numbers, but not by dates.

Norfolk. No. The service records are kept on cards filed by street and number.

H 155. Are there any regulations in force regarding the entrance of employees in houses? If so, attach a copy.

Wheeling. By No. 21 of Rules and Regulations of the Gas Works of the City of Wheeling (1901), it is provided that: "The Trustees shall have the right to stop the flow of gas into any premises, and also to remove the meter, the service pipe, or any or all of the city's apparatus in and leading to such premises, whenever they shall deem it proper to take such action in order to protect the city against loss or fraud, or whenever access to any part of the whole gas apparatus in any house shall be denied to them or their agents or the way to the meter be obstructed, or whenever the consumer shall fail to comply with any requirement made under their rules."

Atlanta. An applicant for a supply of gas is required to sign the following application:

APPLICATION FOR GAS. Form 91 A.

Atlanta, Ga., ... 190 .

. . . . hereby make application to the Atlanta Gas Light Company for gas, to be supplied by a meter located on premises No. . . . . street, occupied by . . . . as a . . . . and agree to pay for the same promptly, at the regular price and according to the rules of the company; also to hold . . . . responsible for all gas registered by said meter until forty-eight hours after notice has been duly given at the office of the company to discontinue the supply.

It is further agreed that the duly authorized agents of the said company shall have free access to the meter and its connections at all reasonable hours and for any purpose, and may remove the same, and may also, upon . . . . . . failure to comply with any of the rules of the company, sever the connection with the service pipe, and discontinue the service.

. . . .

APPLICATION FOR GAS. Form 91 B.

Atlanta, Ga., ... , 190 .

. . . . .hereby make application to the Atlanta Gas Light Co. for gas to be supplied by a meter located on the premises No. . . . . street, occupied by . . . . as a . . . . and in consideration of the company placing a prepayment meter in said premises, I hereby agree to become responsible for the protection of said meter, and further agree to make good to the Atlanta Gas Light Co. any damage either by injury to or loss of money from the meter, by theft or otherwise, as shown by the meter dials. It is further agreed that the duly authorized agents of the said company shall have free access to the meter and its connections at all reasonable hours and for any purpose, and may also, upon . . . . failure to comply with any of the rules of the company, sever the connections with the service pipe and discontinue the service.

Norfolk. Applicants for gas are required to sign the following application agreement:

No. 6888. Norfolk, Va., ...

I hereby make application to the City Gas Company of Norfolk for gas to be supplied to the premises No. . . . . occupied by . . . . as a . . . . and agree to pay for the same at the regular price, and according to the rules of the gas company hereto attached and made a part of this application, the receipt of a copy of which is hereby acknowledged. Also to hold . . . . responsible for all gas consumed on the said premises until forty-eight hours after notice has been duly given at the office of the company to discontinue the supply. It is further agreed, that the duly authorized agents of the said company shall have free access to the meter and its connections at all reasonable hours, and for any purpose and may remove the same, and may also, upon .... failure to comply with any of the rules of the company, sever the connection with the service pipe and discontinue the service.

....

Consumers' Ledger, folio .....
Size of meter, ...
Deposit, $..................

1. Application for the supply of gas must be made upon blank forms furnished by the City Gas Company of Norfolk, and the applicant must agree to be bound by the company's rules and regulations then in force, or thereafter adopted, regulating the supply thereof, and sign the agreement to that effect.

2. The City Gas Company of Norfolk will place in position all service pipes and connections from the street main up to and including the meter. The Gas Company reserves to itself the right in all cases to determine where the meter shall be located.

The gas company will charge 10 cents per running foot for the service from the curb to the meter, plus the actual cost of repaving.

3. The meter is the property of the gas company. No person, except its own employees, shall be allowed, UNDER ANY CIRCUMSTANCES, to do any work upon, to disconnect or to interfere in any way with the meter, or the pipes and connections leading thereto. Persons violating this rule will render themselves liable to the penalties imposed by law, and consumers knowingly permitting others to do so will be equally liable.

4. Gas will be supplied by meter only, the registration of which shall be prima facie evidence of the quantity of gas passed through it, subject in all cases to verification by testing in cases of dispute. The gas company has set up at its office complete testing apparatus, where consumers can see their meters tested. The testing will be done free of cost.

5. The consumer, having the entire control of the pipes, fixtures and fittings, from the outlet of the meter, is responsible for any leakage or waste of gas or any theft thereof which may occur after it leaves the meter.

The gas is delivered to the consumer at that portion of the outlet coupling which is soldered or otherwise secured to the meter; the responsibility of the gas company for any loss, damage, or injury to person or property, however caused, absolutely ceases at this point.

6. When notified by a consumer of any leakage on his premises, the gas company will, free of cost to the consumer, search for and endeavor to stop the leak. But where, in its opinion, the services of other than its employees are needed to repair the pipes and stop the leakage, the entire expense shall be borne by the consumer.

It is expressly understood and agreed, however, that the company assumes no responsibility whatever as to the consumers' fittings and fixtures, or their suitability or condition.

7. On taking possession of premises where a meter is already set, the new consumer is required to notify the gas company in writing at or before the time of such occupation, in order that the meter index may be read for the purpose of ascertaining the quantity of gas previously used. Any one neglecting this rule and afterwards using gas, will be responsible for all gas indicated by the meter since the period of the previous examination.

To prevent all liability for gas consumed by succeeding tenants, consumers are required to notify the gas company when vacating their premises. The gas company will then read the meter index, and liability on the part of the vacating consumer will cease.

8. The gas company may require satisfactory security for the payment of gas expected to be consumed, or the deposit with the Company of a sum sufficient, in its judgment, to secure it from loss, and the Company shall not be bound to supply gas until these conditions are fulfilled, and may cut off the supply, if security is not given when demanded.

9. All accounts are payable at the Company's office, No. 58 Plume street, in the city of Norfolk, and are due as soon as rendered.

10. Discounts will only be allowed on accounts paid within the first five (5) business days of the month following the month in which the gas is consumed, and when gas accounts remain unpaid thereafter the supply of gas may be stopped and legal proceedings instituted for the recovery of the amount due.

11. No gas will be turned into any building until the piping has been tested by the Company, and a certificate that gas may be safely turned into the same is made by its inspector, and furnished to the applicant.

To insure a satisfactory supply of gas, and to assist in securing to consumers a sufficient and proper system of distribution, there must be furnished to and approved by the Gas Company, in case of any building supplied with pipes after July 1, 1896, a correct plan of piping beyond the meter, and the Company must also be notified before such piping is covered, and allowed to examine the same.

Detail rules to be observed by gas-fitters will be supplied by the Company.

All persons, except employees of the Company, are forbidden to turn gas into any building.

12. In case of a leak or escape of gas from any cause all persons are cautioned not to take or permit to be taken a fire or light of any kind into any room or place where such gas may be or might find its way, and to immediately notify the Gas Company or some plumber or gas-fitter of such leak or escape.

13. The Company shall, at all reasonable times, by its authorized agent, have the right of free access into premises to which gas is supplied, for the purpose of examining the gas piping and

apparatus, or for the removal of such as belongs to the Company, or for the purpose of ascertaining the quantity of gas consumed or supplied.

14. The Company reserves the right to alter and vary these regulations, and parties using gas after notice of such alterations shall be bound thereby.

Norfolk, Va., ...190 ,

.........................., the undersigned, do hereby legally guarantee the prompt payment to the City Gas Company of Norfolk, of all bills or debts contracted with the said City Gas Company of Norfolk by ...... for the supply of gas until ...... shall give the said City Gas Company of Norfolk written notice that I will be no longer responsible. This guarantee is without any limit (as to time, location, or amount), restriction, or reservation, until said written notice is given. I furthermore agree to pay said bills or debts without delay.

Witness my hand and seal the day and date above written.

.... (SEAL)

H 156. Does any one inspect the work done by employees in consumers' houses?

H 157. If so, is this inspection general, or does it include every job?

Wheeling. The only work of this kind done is the setting of meters, and there is no inspection of any one apart from the meter setters.

Atlanta. There are two inspectors who examine the work done by the company's employees and also house piping done by private firms. The inspection is general.

Norfolk. The foreman of outside department (foreman of jobbers) makes such inspection. The inspection is general.

SUPPLEMENTARY REPORT ON WHEELING GAS PLANT.

Appraisal of the plant at Wheeling in the event of permission being given to the natural gas company to sell gas for general purposes; dated May 8, 1906; by Alfred E. Forstall, Consulting Engineer, 58 William St., New York City.

Addressed to Professor Frank J. Goodnow, Chairman, etc.

"Dear Sir: You will notice that in giving the appraisal of the value of the Gas Plant at Wheeling in the schedule submitted for that plant, no estimate is given of 'the value of the plant in the event of permission being given to the natural gas company to sell gas for general purposes,' although such an estimate was called for by the motion adopted by the Committee of Twenty-one at the meeting held in Wheeling on March 9, 1906. This omission is due to the fact that Mr. Burnett and I could not agree on this point and therefore decided to put into the schedule only those figures upon which we did agree, and to submit separate estimates of the value of the plant in the contingency mentioned in the quotation given above.

Since incandescent burners enable natural gas to be used for the production of light with as great an efficiency per cubic foot as can be obtained from manufactured gas, it is evident that, with the difference in price at which the two gases are sold, manufactured gas would soon be driven from the lighting field and kept out of it as long as the supply of natural gas was maintained, provided the natural gas company was given the right to sell its gas for lighting purposes. The value of the plant under this condition would therefore depend upon the length of time that natural gas will last.

My investigation of the subject leads me to believe that the supply of natural gas from the West Virginia fields will probably be maintained for twenty years. This being the case, I think that in the event of the removal of restrictions upon the use of natural gas for lighting, the present gas plant would have no value except that which could be realized from the real estate and buildings, plus the scrap value of the apparatus and distribution system. This is so because it would not pay to attempt to keep the plant in condition to be put in use again when natural gas gave out, because even if the cost of maintenance during the twenty-year period did not amount to practically as much as a new works would cost, the present works would be utterly unable to supply the demand for gas that would exist when natural gas gave out, and are not of such a type, nor so situated, that it would pay to use them as the nucleus for the larger works that would be required.

In estimating the value under these conditions, I have taken the real estate at the value given in the schedule, and in the case of the buildings have assumed that one-half the value of the purifying house and one-quarter that of the other buildings could be realized, the larger proportion being taken for the purifying house because this could be more readily altered to suit other purposes than that of gas manufacture. In dealing with the apparatus, I have taken the value of the fire brick and scrap iron that could be recovered from the retort benches, and allowed one-quarter of the original value of the other apparatus, except for the holders. The only value that the holders would have is what could be obtained for the iron in them as scrap iron, and this I have estimated as netting $2,000. The street mains and services would have no value, since, owing to the larger sizes being under pavement, it would cost more to dig them up than could be recovered from the sale of the material after it was taken out of the ground; nor could they be used by the natural gas company, as they are too small and not in sufficiently good condition. At the end of the natural gas period they would not be needed, because the natural gas mains would be available to take care of the business when the manufacture of gas was resumed. In dealing with the consumers' meters, I have assumed that they could be sold at an average price of one-half the cost of new meters.

Working in this way, I reach the following 'value of the plant in the event of permission being given to the natural gas company to sell gas for general purposes:'

Land	$50,000
Buildings	11,000
Apparatus at works	10,500
Consumers' meters	16,000
Total	$87,500

Respectfully submitted,
ALFRED E. FORSTALL."

Special report of Fred. Burnett, Consulting Engineer of Toronto, Canada, on the valuation of the Wheeling Municipal Gas Plant "in event of permission being given to the natural gas company to sell gas for lighting purposes."
Directed to Professor Frank J. Goodnow, Chairman, etc.

"Dear Sir: Owing to the impossibility of determining the length of time during which the natural gas fields of West Virginia will be productive and remain a factor in the gas situation in the City of Wheeling, West Virginia, any value placed upon the gas plant and distributing system owned by the city 'in event of permission being given to the natural gas company to sell gas for lighting purposes,' would be purely conjectural. This being the case, it is manifestly impossible to value the gas plant and distributing system of the City of Wheeling, under the conditions stated with any degree of accuracy, and under the circumstances I would not care to place a value upon them.

If natural gas lasts only a few years the business of the corporation gas plant will be greatly increased, and its value to the city, or a private company, would be materially greater than at present.

On the other hand, if the supply of natural gas can be maintained for a long period and sold for lighting purposes at prices lower than for artificial gas, the gas plant would naturally have to close down owing to lack of business, and the plant would deteriorate, and unless the city, in granting the right to the natural gas company for lighting purposes, received a consideration for the franchise privileges of either a lump sum per annum, or a percentage on the gas sold, the cost of maintaining the plant during the period of shut-down would become a charge upon the city, or the plant would be allowed to deteriorate, and almost an entirely new plant and distributing system would be required when operations were resumed upon the exhaustion of the natural gas supply.

The latter event is bound to occur sooner or later, and at that time the right to sell gas in Wheeling will be a most valuable asset regardless of the condition of the plant and distributing system.

Respectfully submitted,
FRED. BURNETT."

FINANCIAL MATTERS

United States Gas Works

(Schedule IV)

By MARWICK, MITCHELL & COMPANY, Chartered Accountants

WHEELING, WEST VA.

I 1. Secure and transmit a printed or written copy of all rate schedules, forms of contracts, schedules and conditions of discounts, rebates, deposits, penalties, etc., so as to show in detail all charges, such as for tapping mains, turning on gas, and setting of stoves, which any consumer might be called upon to pay, as in force at the end of the last fiscal period, which is April 30, 1905. The last fiscal period was 16 months to April 30, 1905.

I 2. If any of the above schedules, forms, contracts, etc., differed materially from those in force during the last fiscal period, state differences.

I 3. Have rates fluctuated? No.

I 4. Were these schedules, contracts and rules strictly enforced?

No, not strictly. For instance, rule 20 requires that in default of the payment of any gas bill within twenty days after due date, the gas must in all cases be shut off from the premises of the person owing such bill. The secretary states that this rule is not always strictly enforced.

I 5. Were extensions to new territory made free or were they charged for under these rates?

There were not any extensions to new territory during the fiscal period.

I 6. Did consumer pay for damages and repairs to meters and any other appliances furnished by the company or municipality?

Ordinary repairs are not charged to consumer unless damage was caused by fire (see last paragraph of Rule 27).

I 7. Did consumer pay for connections with mains? No.

I 8. Was any part of the cost of laying pipes and main paid by consumers or property owners? If so, what?

Yes. Consumer pays for laying service pipes from curb to meter.

I 9. If meters or any appliances or renewals were supplied free to consumers, state what and upon what conditions.

A charge is made to the consumer for setting and adjusting meters and the laying of service pipes from curb to meter. All material furnished by the works remains the property of the city, and the use of same is at all times subject to the rules and regulations of the gas works.

I 10. Were rates reduced or increased between January 1, 1900, and December 31, 1905? No.

I 11. If so, to what extent? ———

I 12. Was the reduction voluntary, the result of law or ordinance or competition? ———

I 13. If plant has undergone a change from private to public management, or vice versa, give rates just before and just after change, with dates.

The gas works changed from private to public management in 1871. From the record of the suit in chancery between the Wheeling Gas Company and the City of Wheeling and others the price of gas before the city took over the works in 1871 is stated as $3.50 per thousand cubic feet, less 10 per cent. if paid within ten days, equivalent to $3.15 if paid within the discount period. When the city acquired the gas works, the price was made $2.80, less 10 per cent. if paid within ten days, equivalent to $2.52 during the discount period.

I 14. Were bills considered as liens against property, or simply as bills against the consumer?

As bills against the consumer.

I 15. How were bills collected?

By payments made at the gas office and by collector after the discount period. The bills are not delivered or sent out by mail, but consumers are expected to call at the office for them during the discount period and to pay their bills at the same time.

I 16. How often were collections made? Monthly.

I 17. What system of accounts was used during last fiscal period?

No particular system of accounts was used during the last fiscal period. The expenses are distributed to headings of accounts which could be elaborated with advantage. The accounting methods are capable of considerable improvement.

I 18. By whom were the accounts audited?

Mr. W. H. Higgins, Wheeling Steel and Iron Company, Wheeling, W. Va.

I 19. Who paid for this auditing?

The charge of $25 per month is an expense of the gas works. The audit could be made more exhaustive and efficient than it evidently is.

I 20. Who selected the auditor? The Gas Trustees.

I 21. Was each item charged to the proper account?

Yes, with a few exceptions.

I 22. What provision was there for assuring that each item was properly charged?

The bills are approved by the superintendent or the secretary, who marks on same the account chargeable. The board of trustees then approves the bills for payment, and they are charged on the books by the secretary at the time of payment. At the end of the fiscal period, liabilities are set up and the expense accounts charged for the more important bills due and unpaid at the closing date. The duty of the auditor is to see that each item is properly charged. That check has been made monthly.

I 23. Were the accounts of the particular plant kept separate from all others and from the general accounts of the city?

No. The accounts of the electric light plant are also shown in the ledger of the gas works.

I 24. Were expenses for the following items charged upon the books of the plant and included in the financial returns given below? (Answer each separately.)

Taxes. No.

Accident insurance. No.

Fire insurance. No.

Boiler insurance. Yes.

Water used by plant. No; furnished free by city.

Claims and damages. No claims and damages during period.

Gas used in plant and offices. No.

Rental of lands and buildings not owned, but used. No lands or buildings not owned but used except gas office in City Hall, owned by city.

Interest on bonds. No bonds.

Interest on liabilities. Yes.

Depreciation. No.

Sinking funds. No.

I 25. When any city officer performed a service for the plant (*e. g.*, city treasurer or corporation counsel), was any part of his salary charged against the plant?

The city counsel was the only city officer who performed services not charged to the plant.

I 26. Were there any other charges which should properly be included in expenses, but which are actually paid from other sources and were not charged to the plant?

Paving supplied by the Department of Public Works.

I 27. Was the income account credited with services to city departments, such as gas for lighting or heating of public buildings, parks, streets, open spaces, etc.?

The income account was credited and was then debited, the effect of the entries being that the income account does not finally get the benefit of the services for supplying gas to public buildings and hospitals (see answer to I 32).

I 28. Name any other items that should be credited to the income account that were not on the books.

Gas used in plant, offices, and in 5 public street lamps, 1,676,000 cubic feet at 74 cents per 1,000, $1,240; gas to city departments and hospitals, 2,928,400 cubic feet, at 75 cents per 1,000, $2,196.30.

I 29. Was gas supplied free to any one? Yes.

I 30. If so, to whom and upon what conditions?

Public departments	$1,775.90
Hospitals	1,152.50
Total based on gross rate of $1 per 1,000 cubic feet	$2,928.40

No specific conditions attached to this free service.

I 31. What was the approximate value of this free service?

$2,928.40, calculated by the gas trustees at the full rate of $1 per 1,000 cubic feet, or $2,196.30, based on the 75-cent rate.

I 32. To what account was it debited and credited?

Debited to "Gas to the city by meters," and credited to "Gas account," then transferred from the former account to "Profit and loss" account, the net balance on the gas account being also transferred to "Profit and loss" account.

I 33. Has the amount been credited on the books and no further attention paid to it, or have bills been rendered with the understanding that they were not to be paid?

The amount has been shown on the books as explained above, and no further attention paid to it.

I 34. Was there a store room account to which materials were charged when purchased? No.

I 35. What was the system of charging them out to operating accounts when used? ———

I 36. If there was no store room account, how were materials charged?

Materials were charged when paid, an adjustment being made at the beginning and the end of each fiscal period in order to show the liability for any important bills due and unpaid. Many bills, however, applicable to one fiscal period were not shown as charges against that period, but were charged to a subsequent period on the books.

I 37. If the plant was run at a loss, how was the deficit met?

The plant was not run at a loss, but it was burdened with the expenses of the electric light plant, and an appropriation was received from the city to assist the gas plant in meeting these expenses.

I 38. How did the rate of interest paid by the city compare with the rate paid by private public service companies?

Very small overdrafts at bank were subject to 6 per cent. interest, the total interest paid for the period being $33.83. Interest rate, National Telephone Company bonds, 5 per cent., and Wheeling and Elm Grove Railroad bonds, 5 per cent. These two rates were supplied by Mr. A. White, of White & White, stock brokers, National Exchange Bank building, Wheeling. The bonds of the city of Wheeling bear interest at rates as follows: Refunding bonds, 1902, 4 per cent.; loan of 1881, 4½ per cent.; loan of 1885, 5 per cent.; Main street bridge bonds, 4½ per cent.

I 39. In the case of municipal plants, was an appropriation made for the plant?

An appropriation of $20,505 was received from the city council with the intention that it be used for the expenses of the electric light plant, said expenses also being partly met by the funds of the Gas Department.

I 40. Was it lump sum or in detail?

Lump sums of $8,000 and $12,505.

I 41. What is the amount of the bonds or other liabilities of the plant cancelled since it began operation?

Bonds issued under the ordinance of January 18, 1871, $76,500. Payments of bonds issued under the ordinances of October 21, 1872, and June 15, 1875, cannot be traced. Further reference is made to this in the general note to J 13 and 14.

I 42. What provision is being made for paying off the bonds when due? ———

I 43. If there were any items omitted from any of the following accounts, state what, give amounts, actual or estimated, and state reasons why these should be included and the method of computing all estimates.

Depreciation of plant based on the life and the cost of the depreciable property contained in a new duplicate plant, as follows:

Particulars of depreciable plant.	*Cost of depreciable property contained in a new duplicate plant.*	*Rate per cent. of depreciation based on life of plant.**	*Depreciation for 1 year.*	*Depreciation for 16 months.*
Buildings	$39,900	2½	$998	$1,330
Benches	24,000	4	960	1,280
Boilers	800	5	40	53
Condensers, washers and purifiers	19,800	3	594	792
Holders	87,450	2½	2,186	2,915
Exhausters	3,400	5	170	227
Station meter	2,800	5	140	187
Governor and yard connections	3,000	2	60	80
Street mains	86,800	2	1,736	2,315
Services to curb.......	18,800	5	940	1,253
Meters	38,000	2	760	1,013
	$324,750	2.64½	$8,584	$11,445

---

* Per annum

The cost of depreciable property contained in a new duplicate plant and the rate of depreciation based on the life of the plant have been ascertained by Messrs. Forstall and Burnett, engineers.

Amount necessary to increase the charge for maintenance, repairs and renewals of coal gas plant to a normal amount. Estimated normal amount as stated by engineers, four cents per thousand cubic feet made............................$8,518.88
Deduct amount already charged...................... 3,356.48

$5,162.40

Amount necessary to reduce the charge for maintenance, repairs and renewals of meters to a normal amount.

The estimated normal amount as stated by engineers is fifty cents per meter $2,680.00
Plus meters condemned, figured at cost price.......... 1,057.35

$3,737.35
Amount already charged 4,005.00

$267.65

*Taxes on $200,000 (being two-thirds of the approximate value of the plant during the period of sixteen months to April 30, 1905, based on the appraised value at the latter date).

Years 1904 and 1905, county rate $8.50 per thousand dollars; city rate $10.30 per thousand dollars. Rates and methods of levying assessment obtained from Mr. Israel, assessor, $5.013.00.

Gas used by plant and offices, 1,676,000 cubic feet (as estimated by engineers, who state that lights in plant are apparently left burning all day) at cost, 74 cents per thousand cubic feet, $1,240.

Water used by plant, 6,469,000 gallons (as estimated by engineers) at rate of 4½ cents per thousand gallons, rate supplied by water office, $291.

Rental of gas office in City Hall (estimated), $1,333.33.

Accident insurance, 42 cents per hundred dollars on $65,000, rate as obtained from Traveler's Insurance Company, Wheeling, West Virginia, $364.

Fire insurance, 2 per cent. on $17,500 on purifier, and meter house, rate as ascertained from Wheeling insurance agents, $467.

Paving by Department of Public Works, as ascertained from Department of Public Works, $243.70.

Electric light at office in City Hall (estimated), $75.

Legal services of city counsel (estimated), $100.

---

* Mr. Boyce, city solicitor, states that corporations in West Virginia are not taxed upon securities held by them.

I 44. In construction work, has a detailed record been kept of expenditures, so that the amount spent to date is known? No.

I 45. Have records been kept so that it is known that the total cost of construction work will exceed the appropriation before the indebtedness for the excess is incurred?

Yes, the ordinary ledger accounts would be sufficient to give that information.

I 46. Coal used during the last fiscal period for boiler fuel.
(a) Anthracite or bituminous? ———
(b) Brand? Coke (own manufacture).
(c) Cost per ton (2,000 pounds) delivered? $1.50, based on average sale price of own coke.
(d) Number of tons (2,000 pounds) consumed? 577.44 tons, estimated by engineers.

I 47. What other fuel was used? None.

I 48. State quantity of each kind. ———

I 49. State cost of each kind. ———

I 50. Coal used during last fiscal period for retort fuel.
(a) Anthracite or bituminous? ———
(b) Brand? Coke (own manufacture).
(c) Cost per ton (2,000 pounds) delivered? $1.50, based on average sale price of own coke.
(d) Number of tons (2,000 pounds) consumed? 6,507.394 tons, estimated by engineers,

I 51. Gas coal used during last fiscal period—
(a) Anthracite or bituminous? Bituminous.
(b) Brand? Monongah lump coal.
(c) Cost per ton (2,000 pounds) delivered? $1.69 to railroad siding; 21 cents hauling; total $1.90.
(d) Number of tons (2,000 pounds) consumed? 24,971.31, from which was produced the coke for sale, coke for boiler fuel, retort fuel and a small amount of coke used at electric light plant, all as per details in answer to I 51.

I 52. Enrichers: give kind, quantity and cost of each used. ———

I 53. Give quantity and cost of water used.

6,469,000 gallons, at a cost of $291. Quantity estimated by engineers. Cost based on rate supplied by water office.

I 54. Give quantity of each by-product produced and value as sold.

(1) Ammoniacal liquor produced from 25,718.1245 tons of coal, $1,925.87.

(2) Coke, 817,374 bushels, $24,154.46.

Own coke used for boiler fuel amounted to (estimated).....	577.44 tons, or	28,872 bu.
Own coke used for retort fuel amounted to (estimated).....	6,507.394 “ “	325,370 “
Own coke used at electric plant amounted to (estimated).....	12.44 “ “	622 “
Own coke sold....................	9,250.2 “ “	462,510 “
	16,347.474 tons, or	817,374 bu.

(3) Tar, 362,068 gallons, valued at $13,516.11.

I 55. What were the provisions of the contract between the private company and the city for public gas lighting of all kinds? Attach here a copy of the contract. ———.

I 56. Number of years for which contract is made and date when made. ———

I 57. Total number of hours each lamp, exclusive of Welsbach, was lighted during that year. ———

I 58. Total number of hours each Welsbach lamp was lighted during the year. ———

I 59. Number of lamps. ———
(a) Welsbach. ———
(b) Other lamps. ———

I 60. Price per year. ———
(a) Welsbach. ———
(b) Other lamps. ———

I 61. Did these prices include renewals and repairs? ———

I 62. Were there any other charges for public lighting? ———

I 63. Did the municipality own the lamp posts?
They did, but only use 5 of those remaining.

I 64. Did the municipality own the burners upon Welsbach lamps? ———

J—CAPITAL STOCK AND BONDS.

J 1. As of date (end of last fiscal period). April 30, 1905.

J 2. Amount of stock authorized by charter or statute. None.

J 3. Amount of stock authorized by vote of company. None.

J 4. Amount of stock outstanding. None.

J 5. Amount of stock in treasury. None.

J 6. Amount of stock issued. None.

J 7. Amount of stock fully paid. None.

J 8. Stock issued. None.

J 9. Explain how each issue of stock was disposed of, whether private sale, public auction, stock dividend, at par to stockholders, bonus, etc. ———

J 10. Number of stockholders. ———

J 11. Amount of bonds authorized by charter or statute. ———

J 12. Amount of bonds authorized by municipality or vote of company.

(1) By ordinance passed January 18, 1871	$100,000
(2) By ordinance passed October 21, 1872	20,000
(3) By ordinance passed June 15, 1875	45,000
	$165,000

(1) Was authorized for the purpose of providing funds for the purchase of the gas works. Bonds redeemable on or before January 1, 1891. Interest 8 per cent. per annum.

(2) Was authorized for the purpose of providing funds for making improvements at the gas works. Bonds redeemable in four, eight and twelve months, the dates of payment being as follows: March 13, July 13, November 13, all in the year 1873. Rate of interest, 8 per cent. per annum.

(3) Was authorized for the purpose of providing funds for the extension of mains. Bonds redeemable on or before July 1, 1890. Rate of interest, 7 per cent. per annum.

J 13. Amount of bonds issued?

Under the ordinance of January 18, 1871, $76,500.

Issues under the ordinances of October 21, 1872, and June 15, 1875, cannot be found, except that in the former case an uncompleted account in the gas works ledger in existence at that date shows entries as follows:

November 13, 1872, bond No. 1 cash	$7,000
November 13, 1872, bond No. 2 cash	7,000
November 13, 1872, bond No. 3 cash	6,000
	$20,000

See note on J 13 and J 14 on p. 577.

J 14. Amount of bonds paid.

The bonds issued under the ordinance of January 18, 1871, $76,500.

July 1, 1872	$5,500
July 1, 1873	5,500
July 1, 1874	5,500
July 1, 1875	6,500
July 1, 1876	7,000
July 1, 1877	7,500
July 1, 1878	15,000
January 16, 1879	500
July 1, 1879	15,000
July 1, 1880	8,500
	$76,500

Payments of bonds issued under the ordinances of October 21, 1872, and June 15, 1875, cannot be traced.

General note to J 13 and J 14:

The gas works accounts covering the period from September 25, 1871, to November 30, 1878, do not clearly disclose the payments made on the redemption of bonds of $20,000 or any transactions relating to the loan of $45,000 authorized June 15, 1875. During the period referred to, the revenue of the gas works was paid over to the gas loan commissioners and an account "Gas Commissioners" carried in the gas works ledger. The debit balance of that account at November 30, 1878, was $109,473.08. The next ledger commences about February 21, 1879, and contains a similar account, commencing as at April 1, 1879, with a balance of $4,027.88. The record of the transactions for the intervening period cannot be found. Nor is any assistance given by the ledgers of the city clerk, kept at that time, for the accounts headed "Gas Commissioners" kept in the city clerk's ledgers at the period referred to do not agree with the corresponding accounts in the gas works ledger. Considerable confusion appears to have existed in the gas works accounts, and also in the accounts relating to the gas works kept in the city clerk's ledgers at that particular time. Besides the irregularity in the records of the gas ledgers already referred to, an instance of the confusion found in the ledgers of the city clerk during that period may be given. Ledgers existed as follows:

(a) January 1, 1873, to February 28, 1877.
(b) January 1, 1877, to December 31, 1883.
(c) December 1, 1876, to December 31, 1878.

It will be seen that all of these ledgers cover some part of the period from January 1, 1873, to December 31, 1878, but do not connect the one with the other. It is stated that certain books of account of the gas works were intentionally burned on January 27, 1879, by two employees, who were arrested at the gas office on February 9, 1879, charged with incendiarism, and released in January, 1881. It is clear, therefore, that information under this heading, relating to these early periods, cannot be considered absolutely reliable. A most exhaustive examination, covering the records of a number of years, would be necessary to disclose further information and, even then, we feel convinced that the information obtained would not be entirely satisfactory.

J 15 to J 21 inclusive either do not apply or are explained elsewhere.

K—ASSETS.

K 1.	As of date (end of last fiscal period), April 30, 1905.	
K 2.	Cash on hand.......................... (Includes estimated amount of $75 held for depositors. No permanent record is kept of deposits received or repaid.)	$10,584.87
K 3.	Notes receivable	......
K 4.	Sundry accounts due.....................	10,083.41
K 5.	Investments (giving particulars)...........	......
K 6.	Patent rights	......
K 7.	Office furniture	1,500.00

K 8.	Land—		
	(a) Now used for gas purposes	$50,000	
	(b) Not now used for gas purposes	....	
			$50,000.00
K 9.	Buildings		35,900.00
K 10.	Manufacturing equipment and holders		126,830.00
K 11.	Street mains and service pipes (if owned by plants)		74,600.00
K 12.	Meters		30,400.00
K 13.	Other permanent works (scale, $300; piping $50)		350.00
K 14.	Gas coal on hand		348.75
K 15.	Residuals on hand		450.00
K 16.	Gas materials on hand		266.75
K 17.	Gas stoves, fixtures and appliances on hand or rented		......
K 18.	Public lamps owned		75.00
K 19.	Other supplies		7,153.11
K 20.	Sinking fund		......
K 21.	Other current assets		......
K 22.	Other capital assets—		
	Book value of investment in electric light plant	$54,350.43	
	Advance on construction contract for retorts	182.33	
			54,532.76
K 23.	Total		$403,074.65

K 24. Do the values above given represent the original cost of the present assets, their present market value, or cost of duplication?

Plant at cost to duplicate less the amount required to make the present plant equal to the value of a new duplicate.

The value placed upon the land is based on information supplied by Mr. Israel, assessor. On account of various considerations, which require to be dealt with in arriving at an appraised value of the land, Mr. Israel hesitated greatly about mentioning a figure, but finally stated that $50,000 would be a fair sum. Sundry accounts due are valued after making provision for doubtful accounts. Miscellaneous supplies are valued at approximate cost. Investment in electric light plant is given at its book value.

K 25. State how values were fixed.

Value of plant ascertained by engineers. Value of land based on information given by Assessor Israel. Sundry accounts due are valued as per answer to question 24. Supplies are valued at approximate cost.

L—LIABILITIES.

L 1. As of date (end of last fiscal period.) April 30, 1905.

L 2. Capital stock ....

L 3.	Bonds	......
L 4.	Notes payable	......
L 5.	Unpaid bills	$7,944.75
L 6.	Deposits by customers (estimated) No permanent record is kept of deposits received or repaid.	75.00
L 7.	Unpaid dividends	......
L 8.	Interest due, but not paid	......
L 9.	Interest accrued, but not due	......
L 10.	Reserve fund	......
L 11.	Depreciation fund	......
L 12.	Surplus assets*	395,054.90
L 13.	Other liabilities	......
L 14.	Total	$403,074.65

*Applicable to gas and electric light accounts, and subject to appraisal of investment in electric light plant.

M—RECEIPTS.

M 1. For 16 months ending April 30, 1905.

Note on M and N—In order to show the receipts and expenses under the desired headings, it was found necessary in a few cases to estimate the proportions of certain accounts, which require to be distributed. For instance, "labor-purification" was included on the books under "gas making wages account," and therefore an estimated proportion of the balance of the latter account has been transferred to the former heading. In all cases where estimates have been made in the distribution of amounts, a consultation with the officers of the gas works or with the engineers to the sub-committee has been obtained and fair estimates agreed upon.

M 2.	Gas for private lighting by meter, 162,515,200 feet Averages 76.26 cents per thousand cubic feet.	$123,941.73
M 3.	Gas for cooking, heating and power by meter	......
M 4.	Gas for private lighting, unmetered	......
M 5.	Gas for cooking, heating and power, unmetered	......
M 6.	Gas for public lamps (streets, etc.)	......
M 7.	Lighting, repairing, extinguishing public lamps	......
M 8.	Gas for public buildings metered	......
M 9.	Gas for public buildings unmetered	......
M 10.	Gas sold to other gas companies	......
M 11.	Coke Averages 3 cents per bushel.	24,154.46
M 12.	Tar Averages $3.73 per gallon.	13,516.11
M 13.	Ammoniacal liquor Averages 7½ cents per ton on 25,718.1245 tons of coal, from which ammoniacal liquor was produced.	1,925.87

M 14.	Other residuals and by-products			......
M 15.	Rent of meters			$1,079.00
M 16.	Rent of gas stoves			......
M 17.	Rent of gas engines and appliances			......
M 18.	Penalties on delinquent bills			......
M 19.	Gas used at works and offices			......
M 20.	Net profit on sales of stoves, meters, engines and appliances			......
M 21.	Other receipts—			
	Adjusting and resetting meters (collections)		$1,154.65	
	Services installed and repaired (collections), $2,156.77, less estimated amount applicable to new services, $1,500		656.77	
	Holder stock—			
	April 30, 1905	$266.75		
	December 31, 1903	261.25		
			5.50	
				1,816.92
M 22.	Total			$166,434.09

M 23. Give total receipts from gas sold through prepayment meters. ———

M 24. Give quantity of gas thus sold (feet). ———

N—EXPENSES.

N 1. For 16 months ending April 30, 1905.

Manufacturing.

N 2.	Boiler fuel		$866.16
N 3.	Fuel under retorts		9,761.09
N 4.	Generator fuel		......
N 5.	Gas coal		47,453.31
N 6.	Enricher coal gas		......
N 7.	Oil (water gas)		......
N 8.	Labor—		
	(a) Manufacturing	$51,333.22	
	(b) Purification	1,493.00	
			52,826.22
N 9.	Purifying supplies		2,739.94
N 10.	Water		......
N 11.	Maintenance, repairs and renewals of works—		
	(a) Water gas plant	......	
	(b) Coal gas plant	$3,356.48	
	(c) General	......	
			3,356.48
N 12.	Residual expense		3,687.06
N 13.	General expense works		327.95

N 14.	Gas purchased		$751.32
	Representing 5,008,800 cubic feet at 15 cents per 1,000 cubic feet.		
N 14a.	Total manufacturing		$121,769.53

Distribution.

N 15.	Maintenance, repairs and renewals—		
	(a) Mains and services	$4,491.88	
	(b) Meters	4,005.00	
	(c) Street lamps	......	
	(d) Stoves, other appliances rented	......	
			8,496.88
	(b) One account was kept for meters and meter repairs. As there were differences between the inventory of meters at December 31, 1903, and the one at April 30, 1905, which could not be accounted for, we have made up the "maintenance, repairs and renewals of meters" figure from the actual charges for repairs during the period, disregarding inventory figures, and have included the cost of 186 meters which were ascertained to have been condemned.		
N 16.	Expense beyond meter		......
N 17.	Labor—		
	(a) Street lamp operating	......	
	(b) General distribution	$3,584.42	
			3,584.42
N 18.	Miscellaneous distribution (adjusting and resetting meters, material)		358.15
N 18a.	Total distribution		$12,439.45

General.

N 19.	Directors' allowances	......
N 20.	Salaries of committee	450.00
N 21.	General office salaries	4,795.62
N 22.	Rent of offices	......
N 23.	Office expenses	325.62
N 24.	Legal expenses	......
N 25.	Injuries, damages and claims	......
N 26.	Licenses and royalties	......
N 27.	Insurance, fire, boiler, accident	60.00
N 28.	Bad debts	1,500.00
	Estimated amount based on past experience at the plant.	
N 29.	Net loss on sales of stoves, meters, engines and other appliances	......
N 30.	New business	......

N 31.	Other general expenses	......
N 32.	Total general expenses	$7,131.24
N 33.	Total expenses	$141,340.22

Resume.

Total receipts	$166,434.09
Total expenses	141,340.22
Balance to profit and loss	$25,093.87

O—PROFIT AND LOSS.

O 1. For 16 months ending April 30, 1905.

Credit.

O 2.	By balance from last period per books	$491,254.74	
	Add miscellaneous adjustments of book entries per "reconciliation of surplus account as per the books, with the surplus account as per question O 2 as at December 31, 1903"	8,092.28	
			$499,347.02

The above balance of $499,347.02 in subject to adjustment in order to reduce the book value of the plant at December 31, 1903, to its actual value based on the appraisal as at April 30, 1905. See answer to question O 21.

O 3.	By balance of receipts	25,093.87
O 4.	By interest on loans or deposits	......
O 5.	By income from sinking fund	......
O 6.	By other items (Appropriation in aid of expenses of electric light plant.)	20,505.00
O 7.	By balance (if deficit)	......
O 8.	Total	$544,945.89

Debit.

O 9.	To balance from last year	......
O 10.	To interest on bonds	......
O 11.	To interest on bank overdrafts	$33.83
O 12.	To taxes	......
O 13.	To compensation for franchises	......
O 14.	To dividends on stock	......
O 15.	To depreciation fund	......
O 16.	To sinking fund	......
O 17.	To reserve fund	......

O 18.	To other funds (giving particulars)		......
O 19.	To extensions and new construction		......
O 20.	To other purposes (expenditure on account of operations of electric light plant)		$34,940.10
O 21.	To balance (if surplus)—		
	Balance per books	$507,594.97	
	Add miscellaneous adjustments of book entries per "reconciliation of the surplus account as per the books with the surplus account as per section L, question 12, and section O, question 21, as at April 30, 1905	2,376.99	
			*509,971.96
O 22.	Total		$544,945.89

*Balance as above	$509,971.96
Deduct amount necessary to be written off the book value of the plant to reduce same to appraised value	114,917.06
Surplus April 30, 1905, per adjusted balance sheet	$395,054.90

Reconciliation of Surplus Account, per Books, With the Surplus Account per Schedule IV., Section O, Question 2.
December 31, 1903.

	Debits.	*Credits.*
Customers' accounts applicable to the period prior to January 1, 1904, entered subsequent to that date, now adjusted.		$14,690.70
Customers' accounts incurred prior to January 1, 1904, carried on the books as an asset, now considered uncollectible	$6,564.27	
Expenses applicable to the period prior to January 1, 1904, entered subsequent to that date, now adjusted	921.15	
Adjustment of meter repair account		887.00
	$7,485.42	$15,577.70

SUMMARY.

Surplus, per books	$491,254.74
Add credit adjustments as above	15,577.70
	$506,832.44
Deduct debit adjustments as above	7,485.42
Surplus, per Schedule IV., Section O, Question 2 (subject to adjustment referred to therein)	$499,347.02

Reconciliation of the Profit, per Books, with the Profit as Shown by Schedule IV., Section O, for the Sixteen Months Ended April 30, 1905.

		Debits.	*Credits.*
Electric Light Plant Expenses charged on the books to Profit and Loss Account of the Gas Works in error, now adjusted........		....	$34,384 77
Appropriations received from City Council and credited on the books to Profit and Loss Account, now dealt with separately......		$20,505 00	....
Uncollectable Accounts carried on the books as an Asset now written off................		1,500 00	....
Capital Expenditure charged to Profit and Loss Account in error, now adjusted:			
Services (Estimated Expenditure less Collections)...........	$740 00		
Meters	3,572 57		
		....	4,312 57
Customers Accounts entered in the subsequent period, applicable to the current period...		....	9,183 41
Customers Accounts entered in the current period, applicable to the prior period.....		14,690 70	....
Expenses charged in a subsequent period, applicable to current period................		1,420 77	....
Expenses charged in the current period, applicable to prior period..................		....	355 53
Miscellaneous Adjustments of the following Accounts:			
Meter Repairs.........................		1,944 35	....
Coal		....	286 14
Stable		....	258 21
		$40,060 82	$48,780 63

SUMMARY.

Profit, per books..		$16,340 23
Add: Credit Adjustments as above......................		48,780 63
		$65,120 86
Deduct: Debit Adjustments as above....................		40,060 82
Profit, per Schedule IV., Section O:		
Balance of Receipts.....................	$25,093 87	
Less: Interest on Bank Overdrafts.......	33 83	
		$25,060 04

Profit and Loss Account, per Schedule IV., Sections M, N and O, Including Entries Detailed in Answers to Questions 28 and 43 of Section I. Sixteen Months ended April 30, 1905.

		Per Ton (2,000 lbs.) of Coal Carbonized.	*Per 1,000 Cu. Ft. of Gas Sold and Used.*
Receipts			
Gas for private lighting by Meter .	$123,941 73	$4.96	$.741
Gas to City Departments and Hospitals	2,196 30	.09	.014
Gas used in Plant and Offices......	1,240 00	.05	.007
Coke	24,154 46	.97	.145
Tar	13,516 11	.54	.081

		Per Ton (2,000 lbs.) of Coal Carbonized.	*Per 1,000 Cu. Ft. of Gas Sold and Used.*
Ammoniacal Liquor	$1,925 87	$.08	$.011
Rent of Meters	1,079 00	.04	.007
Adjusting and Resetting Meters	1,154 65	.05	.007
Services repaired	656 77	.02	.003
Holder Stock Adjustment	5 50	..	...
Total	$169,870 39	6.80	1.016
Expenses.			
Manufacturing:			
Boiler Fuel	$866 16	.03	.005
Fuel under Retorts	9,761 09	.39	.058
Gas Coal	47,453 31	1.90	.284
Labor, Manufacturing	51,333 22	2.06	.308
Labor, Purification	1,493 00	.06	.008
Purifying Supplies	2,739 94	.11	.017
Water and Gas Used	1,531 00	.06	.009
Maintenance, Repairs and Renewals of Coal Gas Plant	8,518 88	.34	.051
Residual Expense	3,687 06	.15	.022
Works General Expense	327 95	.01	.002
Gas Purchased	751 32	.03	.004
Total	$128,462 93	5.14	.768
Distribution:			
Maintenance, Repairs and Renewals:			
Mains and Services (see contra for collections for Services repaired)	$4,735 58	.19	.028
Meters	3,737 35	.15	.022
	$8,472 93	.34	.050
Labor, General Distribution	3,584 42	.15	.022
Adjusting and Resetting Meters, Material	358 15	.01	.002
Total	$12,415 50	.50	.074
General:			
Salaries of Gas Trustees	$450 00	.02	.003
General Office Salaries	4,795 62	.20	.029
Rental of Offices	1,333 33	.05	.008
Office Expenses	325 62	.01	.002
Legal Services	100 00	..	.001
Insurance, Fire, Boiler, Accident	891 00	.03	.005
Bad Debts	1,500 00	.07	.009
Electric Light in Offices	75 00	..	...
Total	$9,470 57	.38	.057
Total	$150,349 00	6.02	.899
Balance, before charging Taxes, Depreciation and Interest on Bank Overdrafts	$19,521 39	.78	.117

			Per Ton (2,000 lbs.) of Coal. Carbonized.	*Per 1,000 Cu. Ft. of Gas Sold and Used.*
From which Deduct:				
Taxes	$5,013 00		$.20	$.030
Depreciation of Plant	11,445 00		.46	.069
Interest on Bank Overdrafts	33 83		..	...
Total Deductions.........		$16,491 83	$.66	$.099
Balance, being Profit.............		$3,029 56	.12	.018

Reconciliation of Surplus Account, per Books, With the Surplus Account per Schedule IV., Section L, Question 12, and Section O, Question 21. April 30, 1905.

		Debits.	*Credits.*
Customers Accounts entered in a subsequent period, applicable to the period ended April 30, 1905................................		....	$9,183 41
Capital Expenditure charged to Profit and Loss Account in error, 16 months ended April 30, 1905, now adjusted:			
Services (Estimated expenditure, less Collections)............	$740 00		
Meters	3,572 57		
		....	4,312 57
Expenses charged in a subsequent period, applicable to the period ended April 30, 1905.		$1,420 77	....
Adjustment of Meter Repairs Account........		1,057 35	....
Uncollectable Accounts carried on the Books as an asset, now written off.................		8,064 27	....
Accounts Payable at April 30, 1905, relating to the Electric Light Plant, not entered on the books until a subsequent date...........		576 60	....
		$11,118 99	$13,495 98

SUMMARY.

Surplus, per Books..	$507,594 97
Add: Credit Adjustments as above.....................	13,495 98
	$521,090 95
Deduct: Debit Adjustments as above.....................	11,118 99
Balance, per Schedule IV., Section O, Question 21.........	$509,971 96
From which Deduct:	
Amount necessary to be written off the book value of the Plant to reduce same to appraised value......	114,917 06
Surplus, April 30, 1905, per Schedule IV., Section L, Question 12...	$395,054 90

Supplementary Report, Dated May 19, 1906.

It must be clearly understood that the figures given in the following statement cannot be considered absolutely reliable, because of the poor accounting methods adopted by the Gas Department of the city and for reasons indicated in the general note to J 13 and J 14.

Statement Showing Approximate Revenue and Appropriations Received from the City, and Application of Same, as Shown by the Books and Other Sources of Information.

For the 34 Years Ended April 30, 1905.

Profit for 7 2/3 years to December 31, 1878.......	$208,000.00
Profit for 26 1/3 years to April 30, 1905..........	615,600.00
Profit for 34 years to April 30, 1905..............	$823,600.00
Add appropriations received from the city.........	68,200.00
Amount to be accounted for......................	$891,800.00

The above amount is practically accounted for as follows:

Original cost of property, additions and improvements to plant, and increase in net working assets	$455,600.00
Interest on bonds and amounts transferred to the city for general loan purposes...............	99,600.00
Expenditure on account of electric light plant from July 1, 1891, to April 30, 1905..............	362,800.00
Total...............................	$918,000.00

SUMMARY.

Approximate amount to be accounted for..........	$891,800.00
Approximate amount accounted for..............	918,000.00
Difference..........................	$26,200.00

The items of "profits" and "property" are subject to a reduction of approximately $164,000, being the amount necessary to reduce the book value of the property to its appraised value as at April 30, 1905, disregarding the appreciation in the value of the land.

During the 7 2/3 years to December 31, 1878, profit and loss accounts were not prepared and inventories of supplies on hand at the end of each fiscal period were not made. The amount of profit for that period, as above, has been estimated, based on figures obtained from the books.

The profit for the 26 1/3 years to April 30, 1905, has been ascertained from the accounts kept during that period, but cannot be considered accurate, because of the poor accounting methods adopted by the city.

In conjunction with the foregoing figures, it may be interesting to show the changes in the price of gas from 1871 to 1905. These changes are as follows:

1871	Wheeling Gas Co.	$3.50	less 10 per cent.
1871	Municipality	2.80	less 10 per cent.
1875	"	2.30	less 10 per cent.
1877	"	1.80	less 10 per cent.
1879	"	1.20	less 10 per cent.
1883	"	1.00	less 10 per cent.
1888	"	1.00	less 25 per cent.

THE RELATION OF THE CITY OF PHILADELPHIA TO THE GAS SUPPLY

By LEO S. ROWE

I—INTRODUCTION.

The relation of the city of Philadelphia to the gas supply furnishes one of the most interesting and dramatic chapters in the history of municipal government. Four periods are distinctly marked. The first dates from 1835, when Philadelphia began the manufacture of illuminating gas under a combination of public and private ownership. The second period begins in 1841, when private interest was eliminated and the city became sole owner of the gas plant, though continuing its management in the Board of Trustees created during the preceding epoch. The third period coincides with the decade between 1887 and 1897, during which the city exercised exclusive management. The fourth period begins with the leasing of the works in 1897.

Gas for lighting purposes was first used in Philadelphia in 1796. It did not, however, become an object of municipal interest until 1803, when J. C. Humphrey made a proposition to councils to light the city with gas. In 1817 a similar offer was made by James McMurtrie, but both offers were rejected. In 1825 an effort was made to induce the legislature to incorporate the Philadelphia Gas Light Company, but it was opposed and defeated through the influence of members of the city councils. Annually thereafter applications were renewed and refused, and in 1830 a public meeting was called to urge the legislature to take favorable action. At this time gas lighting was still in an experimental stage and the city authorities hesitated to assume the responsibilities involved in its manufacture. In 1833, however, a committee of councils reported favorably and an expert was sent to Europe to examine the practical working of gas lighting. His report was of great interest and explained in detail the whole method of gas manufacture at that time. Many objections to the plan were raised and it was not until March 21, 1835, that the ordinance was passed which provided for the construction of the works.

From the beginning it seems that the city councils acted on the assumption that gas lighting is a public function and should not be delegated to a private corporation, and the first ordinance reflects this spirit in every line. By it provision was made for receiving subscriptions to the stock of a company to be formed for the erection of gas works, to consist of one thousand shares of one hundred dollars each, with the power of increasing the shares to twelve hundred and fifty, on the application of a majority of the stockholders and with the consent of the select and common councils. There was reserved to the city the right at any time councils might deem it expedient, to take possession of the works and convert the stock into a loan redeemable in twenty years and bearing interest at six per cent.

It was further provided by the ordinance that the select and common councils should choose by ballot twelve citizens, to be called trustees of the Philadelphia Gas Works, to be divided into three classes and to serve respectively for one, two and three years. Annually thereafter each branch of the councils was to elect two citizens to serve as trustees for the term of three years in place of those whose term of service expired. All the stock provided for by the ordinance was taken and the trustees commenced the erection of the works. More money was needed to complete the plant and an additional two hundred and fifty shares were therefore issued.

The plant was completed on February 8, 1836, but increasing demand for gas rendered it necessary from time to time to enlarge the works and the mayor was authorized by various ordinances, on the requisition of the trustees, to borrow the money necessary for the purpose. To make provision for the payment of these loans and the accruing interest the trustees were directed "to set apart and reserve out of the money received by them from the manufacture and sale of gas, the sum of eight per cent. on the amount of the certificate of loan, which sum they were directed to apply, first to the payment of the interest, the balance to be invested by the trustees and to be held by them as a sinking fund for the redemption of the loans." The first of these loans was negotiated in 1836 and matured in 1862. The ordinance authorizing it provided that the receipt and payment of all moneys on account of the gas works should be confided to the trustees. Several subsequent loans were made on the same conditions.

II—THE PERIOD OF MUNICIPAL OWNERSHIP UNDER THE GAS TRUSTEES.

On January 14, 1841, an ordinance was passed containing provisions so beneficial to the city and at the same time so disadvantageous to the stockholders that there was good reason to fear that the latter would not agree to them. To meet this contingency it was provided in the ordinance that if the stockholders did not consent to the terms proposed before February 25, 1841, the city should on March first take possession of the gas works under the privilege originally reserved and that the stock held by individuals should be converted into a loan. The ordinance declared, however, that the works should continue under the direction and control of the Board of Trustees with all the powers they then possessed. This was followed on June 17, 1841, by an ordinance authorizing the mayor on the requisition of the trustees to effect another loan for the further extension of the works. By this ordinance the trustees were directed to set apart all the net profits after the payment of the interest upon existing loans to constitute a sinking fund which, together with the buildings, apparatus, pipes and fixtures, was specifically pledged for the payment of the principal and interest of all loans made on account of the gas works.

It was further provided by the ordinance of June seventeenth that "for the further security of said loanholders, it is hereby stipulated that the said works shall be controlled and managed by a board of trustees, elected and constituted as heretofore, who shall have the whole control and management of said works, and of the said sinking fund, and of all funds belonging to the said works, and the said trustees shall pay no part of said funds nor any part of the profits of said works into the city treasury, but shall apply and appropriate the same as directed until the interest and principal of said loans shall be fully paid, as they become due to said loanholders."

The provisions of the ordinance of 1841 were carried into all subsequent ordinances authorizing gas loans to be secured by sinking funds invested, held, managed and controlled by the trustees for the security of the loanholders in accordance with the terms of those ordinances, excepting that in subsequent ordinances a percentage of the profits of the works was pledged to the sinking funds instead of the entire profits. Nine loans were negotiated on the basis of this ordinance, viz.:

No. 1	Dec. 22, 1836	due Jan. 1, 1862	$150,000
No. 2	Feb. 8, 1838	due Jan. 1, 1863	200,000
No. 3	June 3, 1841	due Mar. 1, 1861	125,000
No. 4	June 17, 1841	due Jan. 1, 1866	125,000
No. 5	May 25, 1848	due Jan. 1, 1868	70,000
No. 6	Mar. 15, 1849	due Jan. 1, 1869	100,000
No. 7	Jan. 10, 1850	due Jan. 1, 1870	200,000
No. 8	Mar. 20, 1851	due Jan. 1, 1872	400,000
No. 9	July 18, 1855	due July 1, 1885	500,000

It was not until March 26, 1859, after the passage of the ordinance of January 29, 1855, "to provide a sinking fund for the redemption of the debt of the city of Philadelphia," and the ordinances of May 9, 1857, and June 18, 1857, constituting and appointing commissioners of the sinking fund, that a new system was entered upon and new arrangements made in regard to future loans for the extension of the gas works. On the twenty-sixth of March, 1859, an ordinance was passed for the negotiation of a new loan which directed that the sinking fund charges be paid over to the commissioners of the sinking fund of the city, to be invested and managed by them. It was also provided that the sinking fund thereby established should be pledged to the payment of the loan and any surplus remaining after its payment should be applied by the commissioners of the sinking fund to the liquidation of other gas loans, if any, or otherwise to the liquidation of the funded debt of the city of Philadelphia. These were entirely new features in local financial policy. In the first place, the sinking fund created was not to be vested in or controlled by the gas trustees, but by the commissioners of the sinking fund of the city. Furthermore, the surplus remaining in the sinking fund after the payment of outstanding gas loans was pledged to the extinguishment of the funded debt of the city.

The last loan negotiated in accordance with the provisions of the ordinance of June 17, 1841, was loan No. 9. All subsequent loans were placed on a different footing, the sinking funds attached to them being placed in the hands of the commissioners of the sinking fund of the city of Philadelphia. These loans were as follows:

No. 10	Mar. 16, 1859	due July 1, 1883	$500,000
No. 11	Oct. 22, 1860	due July 1, 1884	500,000
No. 12	Dec. 22, 1864	due July 1, 1884	1,000,000
No. 13	Dec. 26, 1868	due Jan. 1, 1899	1.000,000
No. 14	May 18, 1870	due Jan. 1, 1900	1,000,000
No. 15	Oct. 26, 1871	due Jan. 1, 1902	500,000
No. 16	Nov. 16, 1874	due Jan. 1, 1905	1,000,000

After the payment of loan No. 9, the last loan subject to the obligations of the ordinance of 1841, there remained a surplus of $1,908,777.20, representing the accumulated surplus remaining in the several sinking funds held by the trustees. Councils by ordinance of June 16, 1885, directed the trustees to pay the same to the city treasurer, but the commissioners of the sinking fund claimed that the money so accruing should be covered into the sinking fund. When the question was presented for judicial adjudication in equity proceedings it was held that the sinking funds established by the various ordinances prior to that of March 29, 1859, were not a part of the sinking fund of the city of Philadelphia and, therefore, the surplus of the sinking funds remaining in the hands of the trustees after payment of the loans, was payable to the city treasurer and not to the commissioners of the sinking fund.

In addition to the loans above mentioned, there were two others, one of $450,000 and one of $300,740 for the purchase of the Spring Garden, Moyamensing, Frankford, Richmond, Germantown and West Philadelphia gas works. These loans make the total borrowed capital $8,120,740. The loans outstanding December 31, 1886, amounted to $3,500,000, for the liquidation of which the sinking fund held $1,697,051.78, leaving a balance to be provided for of $1,802,948.22. After meeting the fixed and sinking charges, the accumulated profits on December 31, 1886, from the management of the city's gas works were $5,740,577.85. These loans were paid when due by the appropriations made by councils from the sinking funds in the regular way. That they were never an important burden to the city and that they need not be considered in arriving at an estimate of what were essentially the results of the operation of the gas works may be seen from the following statements:[1]

---

[1] Report of the Director of Public Works for 1887, Vol. III., Mayor's Messages for 1887, page 26.

"With compound interest at six per cent., upon which these sinking funds are predicated, the amounts now on hand and invested, either for the separate loans or for all of them combined, would more than equal the sum to be paid at the dates named, and it will be good management to see to what extent the two per cent. invested annually for these funds can be reduced and yet meet the loans at maturity, notwithstanding the fact that the interest received does not compound at the rate above named."

Three attempts were made by the city to wrest from the trust the control of the gas works. By an act of assembly of February 2, 1854, the boundaries of Philadelphia were enlarged and a joint committee of councils appointed to take charge of the property and appurtenances of the city. The committee notified the trustees of their purpose and asked them to furnish a schedule of the property and effects entrusted to them. The trustees declined to comply. Six months later common councils passed an ordinance providing for the election of a chief engineer of the gas works, to be head of the department and to take charge of the plant. He was empowered, by and with the consent of select councils, to appoint subordinate officers. The ordinance also provided that all money received for gas and by-products should be paid to such officers as the chief engineer should designate. A prayer for an injunction to restrain the city from interfering with the management of the gas works was filed by the Western Saving Fund Society, a heavy holder of gas loans, on the ground that its rights as bondholder would be invaded. The injunction was granted and the decision affirmed by the Supreme Court of Pennsylvania, Chief Justice Lewis holding that "a city in supplying gas to its inhabitants acts as a private corporation and is subject to the same duties, liabilities and disabilities. It cannot impair the obligations of a contract entered into by it in that capacity because it may deem it for the benefit of its citizens to do so."

Again, in 1858, under an act authorizing councils to elect six additional trustees an attempt was made to secure control of the works, and again the Western Saving Fund Society successfully fought the attempt. In 1868 councils passed an ordinance to take possession of the works and transfer the sinking fund to the city. The trustees again successfully appealed to the courts. It was not until July 1885 that it was possible to free the works from the management of the trustees, for not until then did the bonds mature. The gas trust, originally the creature of councils and for many years actually subservient to it, had now become a powerful political instrument.

The trustees of the gas works had, through the skillful use of patronage, gradually secured control of the local political machine. They appointed their friends and dependents to the chief places under the trust and required them to fill the ranks of even ordinary workmen with persons on whom they could depend. These employees were expected to know all the voters in their districts; they attended and swayed the primaries and when an election was held they canvassed and brought up the voters. Their power, therefore, went far beyond their mere voting strength, for a hundred energetic "workers" meant at least a thousand votes. With so much strength behind it the gas ring, with Mr. McManes at its head, became not merely indispensable to the republican party in the city, but in fact its chiefs, able therefore to dispose of the votes of all those who were employed permanently or temporarily in the other departments of city government. They commanded a majority in select and common councils. They managed the nomination of members of the state legislature. "The city councils might indeed ask for information, but Mr. McManes was careful to fill the city councils with his nominees and to keep them in good humor by a share of whatever spoil there might be and still more by a share of patronage."

In 1880 the horizon began to clear. Several honest and outspoken men who had found their way into common and select councils denounced the prevailing corruption and by demands for investigations began to arouse the citizens. An energetic citizen convened a meeting of leading merchants to set on foot a movement for choosing good men at the elections held in February, 1881. This meeting provided for the appointment of a committee of one hundred, which began its famous war against the ring. The investigations into the management of the gas works which followed revealed the mismanagement, corruption and fraud which flourished under the trust control. During the closing years of the trust management, the gas plant was allowed to deteriorate, improved methods of production were ignored, mains and service pipes were allowed to rust and rot, and no attempt was made to adapt the plan of distribution to the increase in production and consumption.

A joint committee of councils was appointed in 1880 to investigate the condition of the works. The final report says:

> "Your committee can state without hesitation, after two very careful examinations, that the physical condition of our works is bad in the extreme. One could not conceive a large business plant, run upon business principles, in such a condition without reflecting unfavorably upon its owners. At the Point Breeze works nearly sixty per cent. of the total amount of gas produced by the city is manufactured. The general appearance of this plant is that of dilapidation and decay. The buildings are in need of a complete overhauling and extensive repairs. In addition, there are now required two exhaust engines, exhausters, four boilers, new sponge shed, alteration to sponge shed and building, repairs to station meter, two new station meters, a 36-inch main to the Ninth Ward Works, and a holder with a capacity of 3,000,000 feet."

It was shown by the same committee that during the five years ending December 31, 1880, about 1,250,000 tons of coal had been purchased by the trustees for which they paid on an average one dollar per ton more than was paid by other consumers of gas coal within the city of Philadelphia.

From the statements of Engineer Park and Cashier White, the same committee reached the conclusion "that the trust employed at least fifteen per cent. more men than was required for the annual production of gas." The committee in their report stated that "this excess of men resulted from the political condition of the trust; but as it is a matter of $150,000 per year, it should be immediately remedied." Mayor King, in his message of 1884, calls attention to the alarming disproportionate increase in wages under the trust management. "If, as stated by the committee, the excess of labor for the years 1879-80 resulted in a loss of $150,000 per annum, upon the same basis of calculation the loss to the city because of the political condition of the trust has increased to the enormous sum of $369,955 per year during the four years ending December 31, 1884; and the loss to the city from this item is increasing with such a rapidity that is indeed alarming as it exceeds the sum of $450,000 for the year ending December 31, 1884."

The joint committee of councils was unanimous in its opinion "that the leakage, including gas consumed at the stations and works, should not average more than twelve to fifteen per cent. on the whole quantity manufactured, and that by careful attention the leakage could be reduced by at least five per cent., thereby making a saving from this source of at least $125,000 per annum." "The loss from excessive leakage during the four years ending December 31, 1884, equals 127,568,872 cubic feet, which at $1.90 per 1,000 cubic feet, represents a loss from this source of $60,594.80 per annum." In concluding his message of 1884 Mayor King said: "I am firmly of the opinion that since the year 1865 the total loss to the people of this city, caused by the mismanagement of our gas works, exceeds $10,000,000."

III—THE PERIOD OF MUNICIPAL MANAGEMENT.

When the trustees of the Philadelphia gas works on April 1, 1887, turned over the plant to the management of the municipality, the physical condition of the establishment was such as to require large expenditures in order to bring the service even to a fair degree of efficiency. The works when surrendered to the city were valued at $12,883,047.58.

STATE OF THE WORKS.

Assets.

Works	$6,286,211 71	
Street mains	3,734,395 19	
Services	2,099,886 66	
Public lamps	11,814 02	
Valuation of the Spring Garden, Moyamensing, West Philadelphia and Frankford Gas Works	150,000 00	
Valuation of Southwark and Moyamensing, Germantown, Manayunk and Richmond Gas Companies	600,740 00	
		$12,883,047 58
(The above accounts have been reduced in the proportion stated below by the amount of loans created by ordinances of Councils, the proceeds of which were expended for the purposes above mentioned, and which loans were paid at maturity out of the profits of the works.)		
Works	$2,049,820 00	
Mains	1,197,957 80	

Services	$610,408 12	
Public lamps	11,814 02	
Valuation of District Gas Works	450,000 00	
Valuation of District Gas Companies	300,740 00	
		$4,620,740 00
		$8,262,307 58
Cash, Sinking Fund Account	$2,775 28	
Cash, Trustee's Account	189,643 23	
Cash, Samuel M. White, Cashier	14,642 44	
Cash, Redemption of Gas Stocks, payment of interest, etc	1,836 96	
		208,897 91
Coal on hand, 50,639 tons	$202,556 00	
Coke, etc., on hand	4,175 00	
Materials for repairs on hand	13,560 00	
Due for gas sold and on hand	688,661 76	
Due for coke, tar, etc., sold	27,305 16	
		936,257 92
Loans remaining in the Sinking Funds of the following Gas Companies after payment of $300,740 stock, three (3) months' interest thereon, expenses of advertising, etc.:		
Southwark and Moyamensing	$5,150 00	
Germantown	4,500 00	
Manayunk	3,000 00	
Richmond	1,000 00	
		13,650 00
Kensington Gas Company		90,717 79
Shackamaxon Bank, in litigation		3,218 53

Liabilities.

Loans 8*, 13, 14, 15 and 16		$3,501,000 00
For the Sinking Funds for the redemption of the Stock of the following Gas Companies:		
Southwark and Moyamensing	$5,741 79	
Germantown	6,315 00	
Manayunk	3,201 00	
Richmond	1,167 49	
		16,425 28
For dividends unpaid		434 25
For interest on Gas Loan No. 8		28 50
For interest on Gas Stocks		126 00
For redemption of Gas Stocks, payment of interest, etc.		1,836 96
For coal, repairs, materials, etc		253,740 44
For street mains, prepaid		846 25
For services, prepaid		34 20
For accumulated profits expended on the construction of works, laying mains and introducing services		5,740,577 85
		$9,515,049 73

The loans issued for construction and extension of the works had been liquidated by the payment of interest and sinking fund charges from the profits of the works, with the exception of $3,500,000 in still outstanding bonds. As a matter of fact the plant was not worth anywhere near the amount charged against it, as it had been allowed to deteriorate until its real value was but a fraction of the original cost. Furthermore, the system of accounting which had been used by the trust was exceedingly misleading.

---

*$1,000 of loan uncalled for.

All moneys expended in the laying of mains were charged to the account of permanent improvements and not entered on the yearly expense account. Such improvements being charged to capital account, the amount actually expended on the works in any one year did not appear, and in this way handsome profits were for years reported when as a matter of fact the net results of operation should have shown a deficit. This method of bookkeeping might have been made less objectionable if a depreciation account had been maintained. Such a fund was never provided by the trust. The sinking funds were established exclusively for the liquidation of the loans and made no provision for the renewal of the plant. In this way the paper value of the plant grew steadily from year to year in spite of the physical deterioration.

Where no depreciation account is established, it is clear that extensions, repairs and the like must be charged against current expenses. This was not done during the trust period. In fact, the total expenditures were in many years in excess of the total cash receipts. The actual deficit for the period 1884-1887 was as follows:

1884	$110,149.60
1885	143,590.75
1886	140,933.72
1887	108,528.02

The director of public works in commenting on this condition of affairs in 1887 says: "Since 1874, when the last loan for the extension of the works was created, the total cash receipts have been $53,361,103, and the total cash expenditures have been $53,313,528.34," showing that the apparent gains for the period were for the most part fictitious. He continues: "This mode of keeping accounts, charging improvements and extensions to capital account, is strictly correct and necessary to show the amounts expended annually for enlargements, so that the value of the plant can be known, but it is very misleading when the attempt is made to ascertain the actual benefits derived by the city as owner of the works."[1] In short, when the city took control the assets were overvalued and the earning power of the works misrepresented.

In spite of increasing complaints, the trust had taken no steps toward modernizing the plant. In the first report after the city had taken over the works the director of public works says:

> "It is useless for the city to engage in a business that can be made profitable, and then to neglect improvements or enlargements necessary to meet the demands of its consumers, and of a character to insure good gas at the minimum cost of production.
>
> "Except in the Ninth Ward Works, where modern improvements have been to some extent introduced by the erection of the regenerative

---

[1] Report of the Director of Public Works, Mayor's Messages, Vol. III., 1887.

furnaces, gas is made after the most antiquated and expensive methods. Modern appliances have not been promptly nor systematically introduced. Machinery of all kinds, in connection with the making of gas from coal, is altogether unknown in the works, and the result is that these rank lower in the output per man than any other works in the country."

The needs of the Bureau of Gas are summarized as follows: Increased production of at least three million feet per day, increased holder capacity and larger distributing mains. The first requirement could only be met by the erection of additional retort and purifying houses, which could best be built in connection with the Twenty-fifth Ward works, as a point nearer the increased demand, and also because these works were originally planned with a view to a much larger daily output.

In 1889 the director in commenting on the condition of affairs at this period, says:[2] "When the present administration assumed control of the city's gas works they were found in a condition which would have justified the immediate expenditure of several millions of dollars in the rebuilding of stacks, the construction of gas holders, and the laying of larger mains." The distributing system was also defective. It had been built for a city of one-third the population of Philadelphia in 1889 and had already become so inefficient as to threaten to leave large portions of the city in darkness if any unusual demand for gas was made. In spite of the fact that the inadequacy of this portion of the service had become notorious, the trust had taken no measures to improve it. In fact, the length of the mains of the larger sizes (six inches and over) laid in the last decade of trust management (1876-1886) was but slightly in excess of those laid during the preceding decade (1866-1876),[3] although the growth of the city had led to a greater demand in a rapidly increasing ratio. The expenditures for extensions and improvements for the years immediately preceding 1887 are given in the annual reports, as follows:

---

[2] Third Annual Report of the Department of Public Works, dated January 2, 1890. Mayor's Messages, 1889, Vol. III., page 24.

[3] See table, page 610, in discussion of distributing system.

	1883.	1884[1].	1885.	1886[2].	1887[3].
For works	$32,491 95	$362,509 70	$260,768 64	$238,378 12	$417,217 00
For street mains	175,941 84	154,089 29	144,115 48	144,660 23	85,021 82
For service pipes	43,675 19	79,842 65	63,545 75	77,482 56	81,322 07
Total	$252,108 98	$596,441 64	$468,429 87	$460,520 91	$583,560 89
Received for services and main pipes	$15,612 75	$19,022 05	$15,713 13	$25,523 13	....
Value of plant increased by	236,496 23	577,419 59	452,716 74	329,997 78	....

---

[1] Holders and purifying house, etc., at the Twenty-fifth Ward Works included.

[2] For the amount by which the value of the plant has been actually increased by this item, $108,250 must be subtracted for old stacks removed.

[3] This includes the items "works," "repairs," in report of 1887, page 63, *et seq.*

From this table it will be seen that the trust in view of the approaching transfer of control to the city, kept the expenditures confined during the last years as closely as possible to operating expenses. In spite of the popular clamor for a better distributing system, the expenditures for street mains instead of increasing rapidly showed an actual tendency to diminish each year. The inadequate productive capacity, combined with the antiquated system of distribution, was rapidly bringing the works to a point where there would be not only an insufficient amount of gas, but an actual inability to deliver the same to the consumer.

The conditions of the mains, besides making it impossible to deliver the gas, caused so large a percentage of leakage as to become a serious factor in the manufacturing accounts. This defect could not, of course, be checked at the root except by providing better and larger distributing mains. The trust made an effort to fight the leakage by inspecting and replacing defective service pipes. In doing so they were, of course, performing a necessary work, but one which could not strike at the real cause of the trouble. The result of this inspection showed the defective condition prevailing in all branches of the equipment. In 1884 a part of the city between Vine and South streets and east of Ninth street was thoroughly gone over. Of the 7,717 service pipes reported on, 5,553 were found to be defective. The following year the district between Vine and Catharine streets and east of Broad street showed 5,141 defective services in a total of 6.208 inspected. The action of the trust in trying to stop leakage in this way is typical of its management in the closing years of its administration. The service pipes and connections which were allowed to rot and to become leaky were an example of what was occurring throughout the works. The whole system was gradually approaching the point of disintegration and the measures adopted to keep the plant going were only such as would help to tide it over the temporary difficulty and to put off the crash beyond the time when the trust was to surrender control.

The serious condition of affairs was patent to everyone. The chief engineer of the gas works in the last report of the trustees in commenting on the condition of both the distributing services and the manufacturing plant, says:[7]

> "I would also again invite your consideration to the subject of the rearrangement of the general distribution of gas through the city by the substitution of larger mains in many portions thereof, it being almost impossible to supply certain sections of the city during the early hours of the evening, the demand for gas in these districts and throughout the city already taxes the manufacturing capacity of the works to their utmost extent, and it is imperatively necessary that extensive additions should be made at once to the manufacturing department, in order to meet the demand thus made."

Attention is then called to the new regenerative system of furnaces recently tried at the works which, however, required important changes in the plant if they were to attain their greatest efficiency.

---

[7] Fifty-second Annual Report of the Trustees of the Philadelphia Gas Works, January 28, 1887, page 32 *et seq.*

"If it is proposed to run the Ninth Ward Works to their utmost capacity, in connection with the regenerative system of manufacture, it will be necessary to add to the purifying and measuring capacity of that works, otherwise the gas cannot be removed from the benches or purified and measured as rapidly as manufactured, which would prevent the realizing of the benefit expected by the adoption of the system. The purifying capacity since the regenerative system has been in operation the past month has been taxed to the utmost, and compelled the forcing of the gas through the purifiers and pipes beyond their safe capacity, causing a heavy back pressure during the heaviest manufacture, which is damaging and dangerous to the benches."

The following year (1888) when the plant was under direct city control the chief of the Bureau of Gas in his first report sums up the condition and needs of the works in the following words:

"Upon the subject of large mains, I will take occasion to remark, that wherever they have been laid they have always benefited the distribution, and that, by reason of their introduction, the complaints of a few years ago of a poor supply in the districts through which they have been placed, numbered as they were by the thousands, were reduced to a very few, which, upon investigation were traced to local causes. I would urge the importance of immediate attention being given to the laying of large mains, so that the miles upon miles of small pipes laid within a few years may be properly supplied. The large mains now supplying them were sufficient for the purpose when put down, but, owing to the rapid growth of the city, are now inadequate. Unless this matter be acted upon promptly greater cause for complaint will exist, and that cause will be increased with every length of small pipe laid. Great difficulty is now experienced by consumers in getting sufficient gas in the early part of the night, and it seems hardly necessary to say that, with twenty miles more of small pipe to be laid this year, unless the feeding capacity is much enlarged, that difficulty will be greatly increased before the close of the year. Some relief will be afforded by the laying of the mains provided for in the ordinance approved December 6, 1887, but that will not be nearly sufficient if we are to remove all cause for complaint. * * * The introduction of the large pipes, and that alone, will remedy the difficulty. * * * The recent trouble has been due entirely to the facts stated, as may be demonstrated any night. * * * Everybody lights up at the same hour. This immense demand exhausts a greater quantity of gas from the small pipes than can be replaced at once, and this results in a diminished flame, which continues until later, when by pressure caused by extinguishment of lights in stores and factories, the pipes are again filled.

"A necessity also exists for more holder capacity, and as it takes considerable time to excavate for and construct the tanks and holders, the work should be speedily begun if we are to have the use of them during the coming winter. We have been exceedingly fortunate in getting through the present winter without any great inconveniences, but we cannot reasonably expect, with the constantly increasing demand for gas, to pass another winter so easily with the same capacity. In another aspect have we been fortunate. At the height of the demand more gas is consumed than it is possible for us at the present to make. Had an accident happened whereby we should have been deprived of the use of any portion of our manufacturing or storage departments just at that time, the inevitable result would have been that portions of the city must have been in darkness. I wish to guard against the possibility of such a thing occurring, and it is with some degree of earnestness that I urge an enlargement of both of these departments. The adoption of the means of giving an increased manufacturing capacity, sanctioned by yourself and his Honor the Mayor, would see us safely through this and several succeeding years. As to the storage question, there should be a one-millon holder located in the southwestern part of the city, and another of equal size at the Twenty-fifth Ward Works * * *. As a means of giving a greater manufacturing capacity, I will say, that by substituting what is known as the half regenerative system for the stacks at present in the Retort House at the Twenty-sixth Ward Works, we can increase the capacity more than threefold without requiring more room and without adding to the labor account. As at present we can make 1,500,000 cubic feet, while with this improvement the output would reach 5,000,000 cubic feet. This, however, would involve an additional expenditure for a 30-inch main to the Ninth and Mifflin streets holder station, and thence to the 30-inch main at Front and Chestnut streets. A new purifying house, with pans, etc., and a new station meter, would also be necessary if this suggestion is adopted. The half regenerative system is already in successful operation in several cities.

"Among the actual necessities are two 18-inch exhausters—one at the Twenty-sixth Ward Works, to replace one just broken down, and one at the Fifteenth Ward Holder Station. This latter one will be required, so that the object sought by the construction of the holder at that point already provided for can be accomplished. Without it I question whether the supply of gas in the northwestern part of the city will be materially improved.

"Greater facilities are required at the Ninth Ward Works for cooling the gas before it enters the purifiers. These can be obtained by running a 20-inch air condenser around the eastern end of the retort house. There is no question that, at present, the gas goes into the condensers and washers at too high a temperature. By the extension of the air condensing surface as above indicated the quality of the gas will be undoubtedly improved. This air condenser was among the improvements contemplated by the Trust, but it was not placed in position for want of time."

The problem of how to make the gas works efficient was evidently one which would necessitate the expenditure of a large amount of money and radical changes both in the methods of manufacture and the distributing system. The city received from the gas trust a number of dilapidated buildings fitted with machinery of a type long abandoned by progressive manufacturers, and a system of gas mains of capillary dimensions which involved high pressure and great leakage in order to deliver the gas to the consumers.

In a word, the officers to whom the city entrusted the management of its gas supply had a stupendous task before them. They were given the management of a portion of the public works on the verge of ruin and which might be expected to fall to pieces at any moment. They started under the worst possible conditions knowing that they must look to councils for large appropriations if they were to make the gas works a success.

Under such conditions, it is a surprise to learn that in spite of the state in which the works were received from the trust, the city officers were able to report decided improvements in all lines at the end of the first year of management. The chief of the Bureau of Gas in discussing the operations for the year, said:

"It is gratifying for me to be able to say that it is the best exhibit yet made since the establishment of the gas works, showing, as it does, a decidedly increased yield in the production of gas per pound of coal, a marked increased yield of coke and an increased yield in all other residuals, and it is equally gratifying to be able to say that this result has been reached with a reduction in the expense account. In the matter of an increased yield in the production of gas to the pound of coal, the figures have advanced from 4.54 cubic feet in 1886 to within a small fraction of 4.70 cubic feet per pound of coal for the twelve months of 1887. The benefit experienced by this increase can be better appreciated when it is stated that had the percentage of 1886 continued during 1887, the yield would have been 3,052,565,000 cubic feet as against 3,154,842,000 cubic feet, the actual yield. This is a gain of 102,277,000 cubic feet, which, at $1.50 per thousand feet, represents a gain of $153,415.50. The increase in the item of coke sold as compared with 1886, amounts to 204,077 bushels, and so with the other residuals, the increase has been correspondingly satisfactory."[8]

There was, nevertheless, as is shown in the report of the director of public works elsewhere, still an actual loss in the operation by the city in 1887, just as there had been under the trust for many years, but in the following year, 1888, the actual deficit of former years was changed to a credit.

Deficit 1887....................	$108,528.02
Excess of receipts 1888..........	553,420.95

"This change of balance," says the director of public works, "arises solely from the economical management introduced in 1887 and from the introduction of labor saving machinery and modern processes." The new machines provided were, however, but a beginning in the changes that needed to be made. The item of expenditures for "works" and "repairs" rose from $238,378.12 in 1886 to $417,217.00 in 1887, but this represented no unusual expenditure in extending the equipment of the plant. More than $141,000 of the expenditure was incurred for "wages of mechanics and laborers engaged in repairing of works," and only $93,175 was specifically charged against "works."

The expenditure for service pipes rose slightly, but as a peculiar example of short-sightedness, the expenditures for street mains, which had become the most pressing need, were limited by the appropriations of councils to $85,021.82, or but 59 per cent. of the lowest expenditures for a similar object by the gas trust for each of the four years preceding. That councils should still remain deaf to the wishes of the people after the numerous complaints on this point in the gas trust period, is most surprising and that the management of the works, tied down as it was by these inadequate appropriations, was still able to improve upon the showing of the last year of trust management, was no less remarkable.

IV—LABOR AS AN ELEMENT IN THE COST OF PRODUCTION.

Besides the physical obstacles which had to be overcome, however, the success of the works was hindered in other ways. Both the purchasing and selling accounts seem to have been loosely managed, the awarding of contracts was not unattended by favoritism and politics admittedly played an important part in the employment and discharge of employees. Naturally the most important field for improper influence was the manufacturing account, in which the most men were employed and where almost all the important contracts were granted.

---

[8] Annual Report of the Chief of the Bureau of Gas, 1887, page 1.

The payroll of the men engaged in the manufacture of gas formed the most vulnerable point of attack upon the resources of the works. In the trust period this had been a general dumping ground for all the political henchmen who could not be more conveniently stowed elsewhere. This abuse did not cease when the city took active control. In the last year of trust management the wages represented $0.299 in the cost of every thousand feet of gas manufactured, and the first year of municipal management saw this rise to $0.311. Thereafter the labor cost of the manufacture of gas gradually but steadily fell throughout the period, reaching $0.20 in 1897, the last year of municipal operation. This seems a remarkably favorable showing—a reduction to two-thirds the labor cost of a decade before—and compared with the cost under trust management, it undoubtedly is such. The difference is to be attributed, it is true, not only to increased efficiency or more economical service, but in a large degree to the increased production of gas per pound of coal and the introduction of improved machinery.

Wages Paid for the Manufacture of Gas, the Amount of Gas Manufactured and the Wage-cost per Thousand Cubic Feet of Gas, 1886-1897.

Year.	*Wages of men engaged in man'f'g gas.*[1]	*Amount of gas manuf. cubic feet.*	*Cost of wages per cu. ft. of gas manuf.*
1886	$881,919.72	2,946,407,000	$0.299
1887	981,788.81	3,154,842,000	0.311
1888	915,647.82	3,209,874,000	0.285
1889	565,970.29	2,231,509,000	0.253
1890	508,187.84	2,177,073,000	0.233
1891	483,577.89	2,092,315,000	0.230
1892	516,018.68	2,223,188,000	0.232
1893	528,849.20	2,339,119,000	0.226
1894	513,480.93	2,605,378,000	0.197
1895	565,079.67	2,728,065,000	0.207
1896	628,649.82	2,997,065,000	0.209
1897	608,360.11[2]	3,033,153,000	0.200

The showing is, nevertheless, creditable to the efforts of the officials, especially of Director Thompson, who, during the latter years of municipal management, made special efforts to reduce this item of expense. The facts as thus presented are apt to be misleading and do not disclose the real state of affairs, which was that though a great improvement had been made over the days of irresponsible operation, yet the management of the item of labor at the works was thoroughly uneconomical. The payrolls were burdened with large numbers of incompetents whose only recommendation was that they lived in a certain ward and were party friends of men powerful in politics. The number of persons who could be employed in the gas works was as uncertain as it was elastic. The item of "wages" being merged in the manufacturing account made the detection of abuses far more difficult than in any other city department. That political influences were present in the works was a matter of public knowledge and the chief of the Bureau of Gas, in testifying before the Senate investigating committee, December 22, 1896,[3] frankly admitted that such was the case. The fact that for similar services councils provided higher wages than private companies is to be explained in part by the fact that many of those employed were political dependents for whom the city fathers were anxious to provide satisfactory reward for service performed. Stokers were paid a salary, it was asserted, of $2.75 per day.[4] The average wage paid at the works was $1.75 per day, although the director of public works declared that he could obtain equally competent men for $1.25. This policy of paying fifty cents a day above the market value of labor involved an additional annual expense of $275,000. The payroll was further increased through the addition of many laborers under the elastic account of "repairs." The director of public works often testified that under such unusual wage conditions, there were fifty applicants for every place. Both appointments and removals were influenced by politics. The chief of the Bureau of Gas and the director of public works were both under constant pressure to appoint friends of councilmen or discharge other laborers that a vacancy might be found for those who had more influential friends.

---

[1] "Wages of stokers and men employed in retort and purifying houses manufacturing gas, wheeling coke, etc."

[2] To November 30, 1897.

Nor were the political influences which dominated the gas works confined to the securing of appointments. Throughout the works political assessments known as "voluntary contributions" were semi-annually collected from the employees and handed over to the assistant director, by him to be turned over to the party in power, "in violation of the spirit, if not of the letter, of the Bullitt bill and other duly enacted legislation."[5]

The extent to which political influences obtained throughout the gas administration may be further illustrated by the expedient adopted by the Philadelphia Gas Company, from whom the city purchased part of its gas after 1888. So numerous were the applicants who turned up with letters of recommendation from councilmen that the company thought best to adopt some plan which would allow them to satisfy the greatest possible number. A list of all those seeking work was kept in the order of their application and after three months' employment the men were discharged in turn to make room for those on the waiting list. When the inducement to curry favor with the city legislators was strong enough to cause an independent company to adopt such novel methods in the attempt to satisfy all parties, it could hardly be expected that the publicly managed works, for the maintenance of which these men would be called upon to provide, should not prove susceptible to political pressure.

---

[3] "Public Ledger," December 23, 1896.

[4] Testimony reported, "Philadelphia Record," December 23, 1896.

[5] Report of Senate Committee.

The conditions under which men were employed led to further inequality of treatment within the works. It was testified before the Senate committee that part of the men did almost all the work, while others, presumably with strong political backing, had not enough to do to keep them busy. It has even been asserted that some of the employees were never seen at the works except when they turned up on pay day to receive their checks. The gas works employed about seventeen hundred men, a number far in excess of the need, as in Baltimore, where half as much gas was manufactured, only two hundred and fifty men were employed. The result was a very high labor cost in Philadelphia in comparison with other cities. The antiquated methods used in certain branches of the work contributed toward still further increasing the labor cost, as the older methods of manufacture required a larger amount of labor per thousand cubic feet of gas produced.

Whatever may have been the needs of the works in other directions the policy of considering the gas works as an institution designed to give to petty politicians "the right to work," or rather the "privilege to make a living," was one which contributed in no small degree toward disorganizing the service and making it inefficient.

V—PRICE PAID FOR COAL.

The abuses prevalent in the purchasing department were also notorious. The employment of inefficient labor increased the cost of gas on one side, while on the other it was pushed up by the unnecessarily high prices paid for the coal used. The following table shows the amounts of coal charged against gas and the amounts paid for the same for the years of municipal management:

Table Showing Coal Carbonized and Cost of Coal Charged Against Gas.

Year.	*Coal carbonized (tons).*	*Cost of coal charged against gas.*	*Cost of coal (average) to the city.*
1886	324,088	$1,153,601.06	$3.55
1887	335,815	1,360,121.74	4.05
1888	336,874	1,169,988.81	3.41
1889	231,541	765,534.04	3.30
1890	224,182	778,455.00	3.47
1891	215,141	798,641.67	3.71
1892	231,520	775,632.06	3.34
1893	243,211	799,960.69	3.28
1894	269,921	899,934.43	3.33
1895	283,797	899,996.10	3.17
1896	313,144	1,049,969.29	3.35
1897[1]	216,173	756,993.35	3.50

The coal used for the making of gas was of a particular quality from which it was claimed by far the best results could be obtained.

The source of the coal for the years 1895-1896 and the prices paid to the various companies are shown by the following table:

---

[1] To November 30, 1897.

Cost of Coal 1895-1896.

	1895.		1896.		1895.	1896.
	Tons.	*Value.*	*Tons.*	*Value.*	*Cost Per Ton.*	*Cost Per Ton.*
[1]Penn Gas Coal Co.	78,657	$287,098 05	45,000	$156,600 00	$3 65	$3 48
Westmoreland Coal Co.	78,657	287,098 05	45,000	156,600 00	3 65	3 48
Manor Gas Coal Co.	5,000	18,200 00	2,500	9,525 00	3 64	3 81
E. B. Orchard	25,000	91,000 00	12,500	43,375 00	3 64	3 47
Despard Gas Coal Co.	15,000	54,150 00	7,500	28,275 00	3 61	3 77
Montana Coal and Coke Co.	15,000	54,150 00	7,500	28,275 00	3 61	3 77
Gaston Coal Co.	15,000	54,150 00	7,500	28,275 00	3 61	3 77
Newberg Orel Coal Co.	15,000	54,150 00	7,500	28,275 00	3 61	3 77
James Miller Wood	......	....	5,000	28,750 00	....	5 75
Total	247,314	$899,996 10	140,000	$507,950 00	....	....
Contracts for 1896	140,000	507,950 00				
Decrease for 1896	100,314	$392,046 10				

---

[1] "Public Ledger," December 23, 1896.

This table shows two interesting facts: First, that the region from which the supply of gas coal was drawn was a small one centered in the Youghiogheny valley and that there was a remarkable uniformity in the bids submitted. These fields were so situated that they could send coal to Philadelphia at prices unapproachable by other sources of gas coal. The Senatorial committee of investigation elicited further information on the subject. The reports submitted to them showed that for the five years ending with 1896, 180,000 to 200,000 tons were bought annually from four companies in Westmoreland county, the Westmoreland, Penn, Manor and C. B. Orcutt coal companies, and about 60,000 tons were obtained yearly from five West Virginia companies. The contract prices which, within a cent or two, were the same for each coal company, included freight charges to the works and ranged from $3.49 per ton in 1892 to $3.71 per ton in 1893 and down again to $3.45 in 1896. The chief of the Bureau of Gas stated that bids were advertised for, but that there were no other bidders than the companies named, who thus practically held a monopoly of the supply.[3]

The price paid by the city for coal was a source of a great deal of discussion during the latter years of municipal management. It was repeatedly asserted that the city paid too much, and though exact figures are almost unobtainable, the contention seems to be justified. Comparison cannot justly be made, however, with the price of ordinary coal in the market, as the gas coal regularly sold at an advance of from five to ten cents a ton.[4]

Even when allowance is made for this difference, however, the inequality is not wholly explained and it was found, for example, that in 1892-1895 the same gas coals could be purchased at South Amboy, eighty miles farther distant from the coal fields than Philadelphia, for $2.90 and $3.15, prices substantially less than paid by the city.

Fragmentary as is the evidence on this subject, it all points to the conclusion that the city was, to say the least, not purchasing in a free market. Whether the entire difference in price was due to the practical monopoly of the supply by the coal companies in question or whether there were other less evident reasons why the contracts should be placed always where they were, has never been satisfactorily answered.

VI—THE DISTRIBUTING SYSTEM.

It has been shown that the high labor cost was partly due to the needlessly large number of employees and partly to the antiquated machinery used at the works. We have already referred to the fact that the condition of the plant at the time it was surrendered to the city by the trust was such as to make large appropriations necessary for the modernizing of the manufacturing as well as the distributing system. Councils seemed willing to make considerable appropriations to improve the manufacturing plant and the capacity of the works was brought to such a point that for several years the bureau was able to report that it could produce all the gas that was needed. On the other hand, councils consistently refused to make adequate provision for the modernizing of the distributing system. Throughout the period of municipal operation the fatal defect was that the distributing system was entirely out of harmony with the size of the city. This defect councils consistently refused to remedy. During the eleven years of municipal operation considerable sections of the city were supplied through pipes so small that it required unduly high pressure at the works and exhaust pumps at the holders to force the gas into the houses. This gave rise to the inordinately high percentage of gas lost in distribution. Further, enormous quantities of service pipes required renewal. The rotting of old pipes allowed the escape of an ever increasing quantity of gas.

---

[3] See testimony before Senate Committee reported in "Public Ledger," December 22, 1896.

[4] See testimony, "Public Ledger," December 26, 1896.

Many of the pipes had lain in the ground so long that they were rapidly rotting. Chief Park testified that many of these taken up by his repair gangs were so thoroughly decomposed that they fell to pieces of their own weight and often when uncovered were found to have holes a foot long. The earth surrounding them had been turned black by the large amounts of gas which had escaped. To remedy these conditions was one of the chief purposes of the officers in charge of the works. Appropriations for better mains were consistently urged upon councils, but all to no purpose. Up to 1891 those in charge succeeded in having the appropriation raised a little from year to year, but after that the amount fell almost without exception, reaching the minimum of $80,637.88 in 1896.

Owing to the refusal of councils to make these necessary changes the percentage of leakage steadily increased and the complaints of the public became more and more insistent. As a possible means of relief the chief of the Bureau of Gas sought to distribute a greater number of holders throughout the city and supply these sub-stations with large mains from the works. Thus the necessity of high pressure would be somewhat reduced. While this expedient was partially successful, it could not do away with the chief source of loss—the leakage through the small and rotten pipes.

Chief Items of Expenditure for the Gas Works, 1887-1897.

Year.	*Works.*	*Mains.*	*Services.*	*Gas.*	*Repairs.*
1887	$27,250 00	$76,669 80	$57,454 06	$1,482,138 64	$225,872 63
1888	128,568 32	163,576 36	91,059 71	2,120,011 73	273,088 87
1889	276,386 39	140,848 59	96,779 68	1,654,772 85	273,689 55
1890	136,642 17	258,150 63	105,580 70	1,735,762 49	247,413 16
1891	91,550 68	256,121 30	100,675 83	1,801,989 18	228,686 22
1892	133,629 00	142,332 33	100,894 48	1,815,397 23	248,825 52
1893	202,243 47	108,336 80	107,575 03	1,932,674 02	267,997 71
1894	324,616 12	96,774 27	118,905 52	2,014,454 43	326,782 72
1895	18,746 20	115,773 03	113,873 11	2,113,395 72	288,781 71
1896	242,309 53	80,637 88	117,981 87	2,427,043 87	343,513 36
1897[1]	29,230 50	74,292 38	110,479 01	2,089,532 23	313,894 83

---

[1] To November 30, 1897.

Table Showing Linear Feet of Mains Laid (Six Inches and Above) in 1866-1896.

Trust Management.

Year.	*6-inch.*	*8-inch.*	*10-inch.*	*12-inch.*	*16-inch.*	*20-inch.*	*24-inch.*	*30-inch.*	*36-inch.*	*40-inch.*
1867-1876 ...	39,599	54,862	577	43,713	17,047	28,241	......	209	......	1,458
1877-1886 ...	45,827	46,027	20	67,301	8,300	36,062	......	21,707	1,220	......

Municipal Management.

Year.	*6-inch.*	*8-inch.*	*10-inch.*	*12-inch.*	*16-inch.*	*20-inch.*	*24-inch.*	*30-inch.*	*36-inch.*	*40-inch.*
1887-1896 ...	210,368	89,976	368	108,839	1,252	115,848	......	33,164	......	......
1897	31,576	24	....	8	28	188	......	......	......	......
1887-1897 ... Total 11 years.	241,944	90,000	368	108,847	1,280	116,036	......	33,164	......	......

Corporate Management.

Year.	*6-inch.*	*8-inch.*	*10-inch.*	*12-inch.*	*16-inch.*	*20-inch.*	*24-inch.*	*30-inch.*	*36-inch.*	*40-inch.*
1898-1905 ... 8 years.	1,506,861	166,971	....	116,326	65,842	81,392	5,553	58,657	......	......

Length of Mains Laid by the United Gas Improvement Company.

1898-1905.

Year.	*6-inch.*	*8-inch.*	*10-inch.*	*12-inch.*	*16-inch.*	*20-inch.*	*24-inch.*	*30-inch.*	*36-inch.*	*40-inch.*
1898	319,639	77,996	....	54,586	45,321	60,006	5,352	37,923	......	......
1899	272,883	46,880	....	33,276	1,721	128	201	3,073	......	......
1900	154,695	8,266	....	1,972	127	2,484	......	......	......	......
1901	140,637	10,224	....	7,135	......	......	......	......	......	......
1902	164,096	8,813	....	7,239	5,822	4,775	......	3,922	......	......
1903	165,807	7,292	....	6,338	5,904	1,463	......	8,110	......	......
1904	132,275	4,652	....	2,436	3,604	5,701	......	2,959	......	......
1905	156,829	2,848	....	3,344	3,343	6,835	......	2,670	......	......
	1,506,861	166,971	....	116,326	65,842	81,392	5,553	58,657	......	......

Too much credit can hardly be given those in charge for the persistent efforts made to improve this portion of the equipment with the limited means at their disposal, and in comparison with the trust period, what they accomplished is indeed remarkable. From the foregoing table it will be seen that the length of mains of the larger sizes—six inches and over—laid during the first ten years of municipal management was, taken in the aggregate, more than was laid by the trust in the two decades preceding and in the six-inch and twenty-inch sizes, of which the greatest lengths were laid, on an average more than four times as much was laid annually by the city as by the trust. We must admit that whatever may have been the shortcomings of city control, those in charge clearly realized what it was that impaired the efficiency of the works and that, had their advice been followed by councils, conditions would have been greatly altered for the better.

No more conclusive proof that the requests were justified and based on sound business principles can be given than a comparison with the length of mains laid by the United Gas Improvement Company after it took possession of the plant. Such a strong contrast does this present that the table is here given in detail.

VII—THE SYSTEM OF ACCOUNTING.

"MISCELLANEOUS" EXPENDITURES.

The records of the chief of the Bureau of Gas do not permit of an accurate statement of the expenses of the various departments of the gas works. The traditions of trust management were continued to the extent of having a large "miscellaneous" account, into which all charges difficult to classify, and many others for which such an excuse cannot be found, were entered. It was, in fact, a general dumping ground for all expense accounts which it seemed advisable, for political or other reasons, not to include in other departments. An examination of the reports seems to justify the conclusion that this large item was used in a way which tended to cover up the actual results of operations in some of the most important departments. For example, in the "Preferred Loans" account for 1896 we find the following entry:

> "By miscellaneous payments, including wages of inspectors, etc., and salaries of officers and clerks, $340,545.67."

The amount is in itself suspicious when included under so indefinite a heading as "miscellaneous," and there seems to be no good reason why the salaries of inspectors should not have been charged against the manufacturing or distributing accounts respectively, and the same is true to a large extent of the salaries of officers and clerks.

The amounts charged against this elastic item are as follows:

Amounts Entered Under the Heading "Miscellaneous" for the Years 1887-1896.

1887..........	$318,367.87	(April 1 to December 31)
1888..........	386,848.13	
1889..........	326,238.05	
1890..........	320,278.08	
1891..........	333,960.60	
1892..........	363,810.05	
1893..........	368,533.52	
1894..........	393,229.13	
1895..........	389,533.67	
1896..........	340,545.67	

The item listed as "miscellaneous" which had the most uninterrupted growth was that of salaries and wages, an account in which we have already seen there was much abuse throughout the whole period of municipal operation. In 1888, the first full year of municipal operation, this item was $317,772.62; in 1889 it dropped to $267,475.89, but steadily grew thereafter, reaching $340,119.24 in 1895. The detail of expenditures is full of curious entries which seem queer indeed in a gas manufacturing establishment, and by their changeable amounts in different years and sporadic appearance, seem to show that the expenditures might be entered as "extraordinary" as well as "miscellaneous." Considering the report of 1896 as a fair example, we may note the following interesting entries:

Drugs, $1,503.36; veterinary medicine, $247.35; items which taken together are almost three times the expenditure for harness, etc., and seem liberal indeed, especially as the works no longer delivered its own by-products and hence had a limited number of horses. Other interesting entries are: Ice, $624.75; matches, $296.11; candles, $215.25. In short, the miscellaneous account even as it stands seems to show items which are of doubtful use in manufacturing gas. How far the entries of a reasonable character may have been padded also it is, of course, impossible to say.

VIII—THE QUALITY OF GAS.

The quality of gas was a frequent topic of discussion and considerable complaint throughout the period of municipal management. From 1888 until the close of the period of municipal management the city purchased a portion of the supply, varying from thirty-six to forty per cent., from a private company. The gas thus purchased was made by the "water gas process," and by contract was required to be of twenty-two candle power. The gas delivered to the consumer was a mixture formed of this purchased water gas and the coal gas manufactured by the city. The coal gas during the first two years of responsible management averaged 17.65 candle power in 1887 and 18.54 in 1888. The year following the purchase of the water gas began. The mixture showed a decided improvement and the candle power rose above twenty. This was about the average for the next three years, but from 1892 to 1897 the average dropped to a little over nineteen candle power. This was the standard in the holders where tested, but it is doubtful whether the mixture averaged as high as this in all places, as the system of distribution made it highly probable that the gases were not mixed in the same proportion in all districts, and probably a poorer gas was the rule in the portions of the city not supplied from the holders where the tests were made.

Further, another fact repeatedly urged by the public and gradually admitted by the management of the works must be kept in mind, namely; that although the gas registered a fair candle power in the holders it had nowhere near that lighting or heating capacity in the burners of the consumers. For this condition of affairs various reasons were assigned and chief among these was the lack of adequate mains, involving high pressure and great leakage and necessitating the forcing of the gas rapidly through the pipes. This resulted in condensation and the partial loss of the hydrocarbon content. A further common reason for the poor service was the stoppage of the pipes. A white substance called naphthaline condensed from the gas gradually attached itself to the inside of the pipe and by accumulating stopped the flow. This substance, it was claimed by the chief of the Bureau of Gas, was "condensed from that portion of the gas which gives it its illuminating power, which is decreased in proportion to the condensation."[1] Thus the gas was lessened in lighting value in proportion to the difficulty of delivery to the consumer.

Much trouble was experienced in trying to remove this naphthaline from the pipe. At first it was usually removed by forcing a flame of wood alcohol through it or a jet of high pressure steam. These expedients, however, were difficult of application and from the nature of the case could not be applied throughout the distributing system. Later the trouble was gradually lessened by the use of certain products from naphtha, which were mixed with the gas at the works. Even this, however, was but a partial remedy and the just complaints against the quality of the gas when delivered constantly increased during the period of municipal operation.

IX—RESIDUALS.

One of the most important factors in determining the success or failure of a gas plant is the way in which the by-products are handled. Indeed, in determining profits this portion of the management is quite as important as any other single item. The residual account appears to have been one of the most loosely managed during the period of municipal operation. Here again decided improvement was gradually being made as compared with the gas trust period, but the results from operation and from the disposal of the products were far below what they would have been under efficient management.

The amount received from residuals in 1870 under trust management had been but 15.4 per cent. of the price paid for coal; in

---

[1] See testimony reported in "Public Ledger," November 29, 1895.

1875, 17 per cent., and in 1888, 21.9 per cent. It gradually rose until it reached 30.1 in the first year of municipal control. The return the following year rose to 39.2 per cent. of the cost of coal and showed a tendency to rise still higher up to 1893, when the maximum of 46 per cent. was reached. During the remainder of the time of municipal management, the proportion varied from 36 to 39 per cent., with the exception of 1896, when there was a drop to 30.6 per cent., attributable to the low price of coke.

Quantities of Coke and Coke Breeze Sold and Amounts Received from Residuals.

Year.	*Coke. (Bu.)*	*Coke Breeze. (Bushels.)*	*Received from coke, tar, etc.*
1887	5,053,425	480,370	Trust $132,612.56 City 277,844.68
1888	4,641,266	461,500	458,870.20
1889	3,224,285	434,650	325,017.07
1890	2,925,894	554,425	275,714.09
1891	3,005,163	606,000	306,387.55
1892	3,389,513	807,520	346,181.11
1893	3,684,193	1,123,445	368,772.26
1894	3,691,698	1,300,435	359,347.29
1895	4,009,378	1,357,480	330,611.91
1896	3,826,933	1,532,395	321,620.04
1897 [1]	3,315,178	1,194,290 [1]	300,958.02

Receipts From Sale of Coke and Cost of Coal Used in Making Gas, and Percentage of Cost of Coal Received by Sale of Coke, 1887-1897.

Year.	*Cost of Coal.*	*Received from sale of Coke.*	*Per Cent.*
1887	$1,360,121.74	$410,487.24	30.1
1888	1,169,988.81	458,870.20	39.2
1889	765,534.04	325,017.07	42.4
1890	778,455.00	275,714.09	35.4
1891	798,641.67	306,387.55	39.7
1892	775,632.06	346,181.11	44.6
1893	799,960.69	368,772.26	46.0
1894	899,934.43	359,347.29	39.9
1895	899,996.10	330,611.91	36.8
1896	1,049,969.29	321,620.04	30.6
1897	756,993.35 [1]	300,958.02	39.7

Compared with the results under trust management this showing for the whole period was most satisfactory, but comparison with other gas companies operating at the same period does not place the matter in so favorable a light. The report of the Massachusetts board of gas and electric light commissioners, published in 1896, shows the results obtained by companies in that state. The receipts of the large companies from the sale of coke amounted from forty-five to fifty-one per cent. of the cost of the coal used in the manufacture of gas and the average for forty-seven companies is 43.89 per cent. In comparison with the results obtained by the Philadelphia management it was evident that something was wrong, either in the manufacturing process or in the method of disposal of the products.

---

[1] To November 30, 1897.

The testimony before the Senate investigating committee of 1896 on the subject of what amount of residuals ought to be expected in the manufacture of coal gas is of conflicting character. The general conclusion reached in regard to the Philadelphia plant was that less was produced than should be obtained from the amount of coal carbonized. Coke, it was claimed, was lavishly used under the retorts and boilers, thirty per cent. being thus disposed of, while careful management would not require the use of more than twenty per cent.[2]

The price for which coke was sold was fixed by the director of public works and the chief of the Bureau of Gas. The charge was determined by the condition of the market and varied from three to six cents per bushel. It was shown before the Senate committee that the prices of coke varied so much with the locality and the season that no comparison with other cities on this point would be justified, and they reported that they considered the price obtained a fair one.

The greatest irregularity in connection with the disposal of the coke arose, however, in the delivery to the consumer. In the early years of municipal management the gas works maintained an equipment for hauling coke and a profit averaging $5,000 a year was received from that department, but the carts and many of the horses having been lost in a fire were not replaced and the whole business of delivery was turned over to Mr. Hugh Black, select councilman from the Thirty-sixth Ward. Black had no contract with the works, but all orders secured by him were given preference. For delivering the coke he received from 75 cents to $1.25 a load, according to the distance hauled. Many complaints were made by independent parties who could not get coke from the gas works, but the department gave preference to "the customer who bought all the year round" and only "whatever was not taken by Mr. Black was sold to them who presented themselves."[3]

The management of the sale of coke was, to say the least, loose. It was charged that even much more than the "right amount" of coke was taken on a load and the indefinite arrangement with Mr. Black, especially in consideration of the fact that he was also a member of the city council, was unbusinesslike and against the spirit of the Bullitt bill, even if such arrangements were not specifically prohibited by it. In concluding their criticism of this portion of the management the Senate committee said: "The practice of paying Black for hauling should certainly be discontinued and the coke disposed of as a whole or the work of hauling be let out by contract under competitive bidding and the city receive the profit it formerly did when it did the work itself."

---

[2] See testimony of Eugene Vanderpool, ex-President of the American Gas Light Association, given before the Senate Committee, reported by the "Public Ledger," December 22, 1896.

[3] Testimony of the Chief of the Bureau of Gas before Senate Committee, reported in the "Public Ledger," December 22, 1896.

The sale of other residuals was also conducted on a peculiar plan. Instead of being sold by the pound or the gallon, the tar and ammonia were contracted for, the buyers agreeing to pay a stipulated price per ton of coal carbonized at the works. The amount of residuals obtained was stated by Chief Park in 1896 to be about twelve to thirteen gallons of tar per ton and about six ounces of ammonia. These by-products were disposed of under contract. At the time of the Senate investigation in 1896 the Ammonia Company of Philadelphia held the contract for the ammonia by-products. The contract was let every three months, but the company in possession was the only bidder. The amount paid to the city for ammonia was computed at nineteen cents per ton of coal carbonized.

The contract for the disposal of tar also was held by a company which, though it nominally held its contract by making the lowest competitive bid, virtually had a monopoly of the output. The organization was composed of M. Ehret, Jr., William L. Elkins and George D. Widener, operating under the trade name of M. Ehret & Company. The contract for the disposal of the product was awarded every three years. Bids were advertised for, but only ten days before the award of the contract, so that it was practically impossible for any but the former holders to be ready with proposals at the time the contracts were awarded. The price paid for tar in 1891 was thirty-five cents per ton of coal carbonized, but in 1894 the contract price fell to twenty-four cents. There was a higher bidder in the latter year, but it was alleged that "he had not facilities for disposing of the tar and he did not receive the contract."[*]

The testimony as to whether this was a fair price for the tar was conflicting, some witnesses stating that it was about one-half of what it should be, while others asserted that tar could be imported from Great Britain and delivered in Philadelphia at about the price received at the company's works. The Senate committee reported "so far as shown by the evidence before your committee, the price obtained was fair, but the quantity was less than should have been produced from the quantity of coal carbonized had it been properly done."

X—LEAKAGE.

A common cause of complaint against the management of the gas works was the unusually large percentage charged as "gas unaccounted for." This was the portion lost to the city by condensation, defective meters, differences in temperature when measured at the holder and measured at the burner, and most of all, leakage through defective pipes. The amount thus lost showed a steady increase which the management claimed they were entirely unable to check, owing to the insufficient appropriations by councils. The physical causes of the loss of so large a part of the product were discussed in a previous section,[1] and it is only necessary to consider here the proportion of loss due to this cause. A large percentage of gas had been entered as "unaccounted for," even in the trust period, but it rapidly grew during municipal operation. At the beginning, though large, the percentage was not alarming. In 1889, indeed, it had fallen to 12.4 per cent., or but 2.4 per cent. higher than the loss by the management of as efficient a system as that of Glasgow in 1896, but the proportion increased rapidly, and in 1896 was far above any other important gas works in the country. The following comparison for 1896 shows the enormous discrepancy.

---

[*] See testimony before the Senate Committee in the report by the "Public Ledger," December 22, 1896.

Table Showing Gas Manufactured and Unaccounted for in Various Cities in 1896.

City.	*Amount of Gas manufactured* 1896.	*Leakage of Gas unaccounted for.*	*Percentage.*
Philadelphia	4,913,461,000	1,132,646,138	23.0
Manchester	3,762,570,000	116,560,000	3.1
Glasgow	4,525,000,000	425,500,000	10.0
Boston Gas Company...	1,130,189,700	32,692,630	2.89
Brookline Gas Company	753,824,000	58,590,067	7.77
Lowell Gas Company...	315,073,000	20,232,700	6.42

Table Showing Increase in Gas Unaccounted for in Philadelphia for the Years 1887-1897.

Year.	*Gas Manufactured.*	*Gas unaccounted for.*	*Percentage.*
1887...........	3,154,842,000	441,340,419	13.9
1888...........	3,209,874,000	470,736,019	14.6
1889...........	3,151,156,000	399,342,299	12.4
1890...........	3,311,995,000	494,825,734	15.0
1891...........	3,391,887,000	467,970,172	13.8
1892...........	3,584,589,000	561,650,395	15.9
1893...........	3,803,316,000	632,873,186	16.6
1894...........	4,110,401,000	1,003,856,929	24.4
1895...........	4,422,752,000	1,002,140,315	22.6
1896...........	4,913,461,000	1,132,646,138	23.0
1897...........	4,777,310,000	1,390,946,273	29.0

XI—THE WATER GAS CONTRACT OF 1888.

The exclusive manufacture of gas by the city continued only during the first two years of responsible municipal management. At the close of the second year of public management it was evident that in order to prevent the possibility of failure in the gas supply something would have to be done quickly to increase it.

---

[1] See Section VI. on "The Distributing System."

The half-way measures adopted by councils had not greatly increased the efficiency of the works. The natural course in such a situation would seem to be to make an appropriation for the construction of new works at the earliest possible date. Councils, however, adopted the plan of contracting with a private company for the manufacture of gas to supplement that made at the city's works.

The ordinance authorizing the contracts through which this water gas plant was made possible was approved April 6, 1888. The Philadelphia Gas Improvement Company, which was the only bidder, was awarded the contract. The president of the company was William L. Elkins, and the secretary George D. Widener, who, as we have seen, was a silent partner in the firm of M. Ehret, Jr., & Company. The letting of this contract for the supply of water gas, like all others connected with the management of the gas works, seems to have been surrounded by peculiar circumstances. The advertisements, according to the testimony of the chief of the Bureau of Gas, were made only some ten days before the actual awarding of the contract. Further, the chief of the Bureau of Gas had not been consulted in the drawing up of the specifications under which advertisements for bids were made. There are indications that the contracting company felt itself "in the hands of its friends," both in the making and carrying out of the contract. The circumstances surrounding the construction of the new works seem to show that the company definitely looked forward to making their sales to the city a permanent thing and that they had no fear of the purchase of the plant by the municipality. The works[1] from the first were planned and built on a larger scale than had been provided for in the ordinance and were at various times increased in size without further action of councils. As substantiating the supposition that the company looked to increased demand for the service they were to offer, may be noted the testimony of the chief of the Bureau of Gas before the Senate investigating committee in 1896. He there asserted that he had overheard a conversation of the officials of the gas company with an officer of importance in city affairs, who had "given the company a tip" that "it would be all right" to build a larger establishment than that authorized in the ordinance. Apparently there were persons of influence in municipal politics who were able to see that the municipal plant would continue to operate in its crippled condition and would be under the necessity of calling on the new company for an ever larger amount of aid. The friendly relations between the company and councils continued throughout the period in which the municipality was concerned in the operation of the gas works. The water gas establishment was increased in size even faster than the city increased the appropriations for the purchase of gas, reaching by 1896 a capacity of 12,000,000 cubic feet per day instead of 3,000,000 cubic feet, the maximum required by the ordinance.

---

[1] The main authority used for the discussion of the relations between the Philadelphia Gas Improvement Company and the city is the official report of the Senate Investigating Committee. The following quotation from the Senate Report bearing on this phase of the subject is interesting:

"Under this contract the gas company proceeded to erect a plant described in the specifications, and its letter of acceptance, which would have been of the maximum capacity of 1,500,000 cubic feet per twenty-four hours, but under the verbal direction of some officer of the city whose name was not stated, except that it was not the then mayor, the same was enlarged by additions then and thereafter made, so that its capacity is now in the generating house 16,000,000 cubic feet."

The willingness of councils to appropriate for water gas was illustrated by their action in 1896, when of their own motion they raised the item asked for by the Gas Bureau for water gas from $600,000 to $700,000.

In connection with this willingness of councils to make large appropriations for water gas, it is interesting to notice a few sentences from the reports of those in charge of the public operation of the gas works. Concerning the appropriations we find the following statements:

> "Several contemplated improvements for 1896 * * * have been repeatedly urged, but councils have not as yet seen their way clear to providing the money."
>
> "If the extensions suggested had been authorized the department would have been able, upon their completion, to provide the additional demand for gas from the city's works."

On the same point the testimony offered before the Senate committee showed that there was "plenty of money for appropriations for buying water gas," but "very little for the extension of street mains." Another example of the checkmate policy of councils which worked directly to the advantage of the water gas company was the leasing of certain of the buildings of the Twenty-fifth Ward Works to the private company. In these works had been largely concentrated such efforts to introduce improvements as the meager appropriations granted by councils had made possible. The capacity of these works had been thus increased to 6,000,000 cubic feet per day, and when in working order would have enabled the city authorities to furnish "the full average quantity" purchased from the independent company. But by the action of councils a small part of the plant, one of the purifying houses, was rented to the water gas company. By this action the possibility of operating the plant was cut down from 6,000,000 to 1,000,000 cubic feet per day and much of the machinery had to remain idle because the gas when made could not be purified.*

---

* The Senate committee here reports:

"But it appeared that at the Twenty-fifth Ward Works of the city, stated to be of a capacity of 6,000,000 feet per day, in fact only about 1,000,000 cubic feet of gas per day are manufactured and that certain parts of its apparatus, to wit, one of its purifying houses, is rented together with one of its holders to the Philadelphia Gas Company, so that the actual capacity of the Twenty-fifth Ward Works is thereby reduced to a mere nominal quantity and that, although the machinery and apparatus are erected and in place and have within two years been so added to that it ought to be ready and able to furnish the full average quantity of gas actually taken from the Philadelphia Gas Company, those works in fact stand disabled so to do until the city gets back or replaces the small part of this plant rented to the company."

The Use of Coal and Water Gas by the City of Philadelphia. 1888-1897.

Year.		Coal Gas, Cubic Feet.	Water Gas, Cubic Feet.	Total Cubic Feet Water and Coal Gas.		Cost Coal Gas.[4]	Paid for Water Gas.	Total Cost Coal Gas and Water Gas.
1887	Trust..	941,415,000			Trust.	$911,593 49		
	City...	2,213,427,000			City..	1,482,138 64		
		3,154,842,000			Total.	$2,393,732 13		
1888	....	3,209,874,000				2,120,011 73		
1889	....	2,231,509,000	919,647,000	3,151,156,000		1,354,787 21	$299,985 64[2]	$1,654,772 85
1890[8]	....	2,177,073,000	1,134,992,000	3,311,995,000		1,310,478 74	425,283 75[3]	1,735,762 49
1891	....	2,092,315,000	1,299,572,000	3,391,887,000		1,311,205 10	490,784 08	1,801,989 18
1892	....	2,223,188,000	1,361,401,000	3,584,589,000		1,315,397 23	500,000 00	1,815,397 23
1893	....	2,339,119,000	1,464,197,000	3,803,316,000		1,362,149 06	570,499 96	1,932,674 02
1894[9]	....	2,605,378,000	1,505,123,000	4,110,401,000		1,457,558 32	556,896 11	2,014,454 43
1895	....	2,728,065,000	1,694,687,000	4,422,752,000		1,499,251 84	600,000 00	2,099,251 84[6]
1896	....	2,997,065,000	1,916,396,000	4,913,461,000		1,727,043 87	700,000 00	2,427,043 87
1897	....	3,033,153,000	1,744,157,000	4,777,310,000		1,408,021 35	681,138 80[7]	2,089,463 15[5]

---

[2] Due to the Philadelphia Gas Improvement Company $40,203.75 in addition, for gas furnished in December, 1889.

[3] Includes payment for gas mentioned in note above.

[4] Item entered as "payments for the manufacture of gas," from the Engineer's Reports to the Bureau of Gas.

[5] The "expenditures account" gives the amount paid for gas as $2,089,532.23. The figures in both accounts cover up to November 30, 1897.

[6] The item for expenditures for gas in the expense account, however, is given as $2,113,395.72.

[7] The amounts paid differ from the amounts formally appropriated by Councils on account of the varying amounts of gas actually purchased.

[8] Figures given thus in report for 1890, page 142, though the sum of figures for coal and water gas exceeds the total figure of production.

[9] Same in report for 1894, page 67.

From a survey of the conditions surrounding the relations existing between the councils and the water gas company, it hardly admits of doubt that there were powerful influences at work which were to say the least, not deeply concerned about the welfare of that portion of the establishment operated by the city. An examination of the contract under which the water gas company was to supply the city further shows that the shareholders could not have considered the possibility of a strict enforcement of its conditions. Some of the elements which would have aroused dissent had the contract been let under ordinary terms are as follows:

The company undertook to erect the works under a contract which bound the city to purchase from them for a single year only, at the end of which time the contract could be annulled by the city "at any time or for any cause" and the works would thereby become useless. Further, the city could demand that all the company's buildings be cleared from its grounds within three months after the arbitrary annulling of the contract. In case the company should at any time fail to produce the gas contracted for, "no matter for what cause," the entire plant was to be forfeited to the city. Loss on account of any default on the part of the contract was to be paid at the estimate made by the director of public works, whose opinion both as to the occurrence and the extent of the default was to be "final and conclusive." The terms of the contract were such as to raise a strong presumption that those behind it felt that they would not be allowed to suffer by the exceedingly harsh restrictions placed upon them. It is indeed hardly conceivable that financiers would have backed an enterprise under the terms stated had they not had powerful friends to guard their interests in the quarter from which any adverse attack was to be expected. In reviewing the circumstances surrounding the making of this contract and its peculiar provisions, the Senate committee reported:

> "On April 6, 1888, although the relative manufacturing and holder capacity of the Philadelphia Gas Works seemed to have then borne about the same relation to the then average daily production as they now do, the City Councils authorized the Mayor to enter into a contract for an increased supply of gas at a price not to exceed fifty cents per thousand. The terms stated in the ordinance upon which the Mayor should seek to enter into the contract were that said contract should be for the term of one year only, with the privilege of renewal at the city's option from year to year thereafter indefinitely, and be for the manufacture and delivery into the city's holders of not exceeding 3,000,000 cubic feet of illuminating gas per day, and as much more as the city might desire to take; provided six months' notice was given to enable the contractor to provide the necessary apparatus to supply the additional amount. The contract was also to require that the gas to be furnished should not be of less than twenty-two candle power, with a penalty of five cents per thousand cubic feet for each candle power it should be deficient, to be deducted for all gas furnished for thirty days preceding the inspection. Another condition was that the gas should be furnished the city without interruption or delay under penalty of the forfeiture of the works and appliances for the violation of that condition.
>
> "The city was to furnish the land, but to be at no expense for buildings, machinery, labor or material, and the city reserved the right at

any time to terminate the contract 'absolutely or to purchase the works and machinery erected' under the contract at a price to be ascertained by three appraisers, one to be chosen by the city, one by the contractor, and the two so chosen to select a third.

"Under this ordinance, proposals were invited by advertisements under specifications, which designated the Twenty-fifth Ward works as the place where the new works were to be constructed, and it was also therein required, *inter alia*, as follows:

"7. The contracts shall continue for one year from the day of the first delivery of gas, with the privilege to the city of renewals from year to year.

"10. The city shall have the right at any time, or for any cause, to terminate any contracts absolutely, or to purchase the plant, together with the patent rights necessary to manufacture gas, at a price to be fixed by appraisers chosen in the usual manner.

"11. The maximum price to be charged for the use in the city's works of any appliances covered by patents shall be named in the contract.

"12. The city's officials, or experts employed by them, shall have the right to inspect the plant, the materials and supplies, or the gas manufactured, at any time and in any manner deemed necessary by them.

"13. Failure to furnish the gas contracted for in proper quantity or quality, no matter for what cause shall forfeit the plant to the city of Philadelphia, whose officials may at once enter upon and take possession of the same.

"14. The ground of the city shall be surrendered and all buildings, machinery and appliances erected thereon, and all materials shall be removed within ninety days from the termination of the contract, unless they shall have been previously purchased by or forfeited to the city as hereinbefore provided.

"15. Security for the faithful execution of the contract in the sum of $100,000 will be required.

"No bid exceeding fifty cents per 1,000 cubic feet will be considered.

"The bond and agreement ultimately entered into under this ordinance and proposal contained the further stipulation on the part of the contractor that if, in the opinion of the Director of the Department of Public Works, any default should happen on the part of the contractor, he would pay all loss occasioned thereby, and that the ascertained amount thereof, as determined and stated under oath by the director, be final and conclusive upon the contractor, and that execution might forthwith issue against the contractor and his surety for the amount of said default. Under said contract it was also provided that the contractor would in five months from the date of the contract have the plant fully completed and ready to begin the manufacture and delivery of gas; and the contractor further agreed, upon six months' notice, to erect at any other of the city's gas works the necessary plant for the manufacturing of additional amounts of gas required by the city, to be furnished upon the same terms and conditions. The price to be paid the contractor was thirty-seven cents per thousand cubic feet of gas delivered; and the value of the works to be erected was stated by it as $275,000. The patents involved were shown to have long since expired and need no further mention.

"Careful reading of the contract, whereof the ordinance, specifications, etc., are made part, would seem to indicate that the penalties and forfeitures are so severe, and might be so grossly inequitable, that they probably could not be enforced, but the language of the contract seems to be clear and distinct that the contractor was to erect a plant worth $275,000 without any obligation whatever on the part of the city to take any gas therefrom at all, so that his works might lie idle indefinitely; and while on the one hand the city had the unlimited option to renew the contract from year to year, so that the contractor could not take down his works, and so realize whatever they might be worth to take away, yet, on the other hand, the city might at any moment terminate the contract absolutely, whereupon the contractor was required within ninety days to remove the whole plant from off the city's premises.

"And not only this, but the contractor might be required on six months' notice to erect other works on the same onerous conditions.

"It might well be supposed that no one would bid on such a proposal or undertake a contract which left his property absolutely at the mercy of the city, unless, as appears to be the case in respect to other classes of contracts already noted, there was some sort of sympathy and connection between the proposed contractor and the officers of the city. As a matter of fact, there was but one bidder, to wit: The Philadelphia Gas Improvement Company, to which the contract was awarded at the rate of thirty-seven cents per thousand cubic feet of illuminating gas of the kind known as water gas, delivered into the city's holders.

"Under this contract the gas company proceeded to erect a plant described in the specifications and its letter of acceptance, which would have been of the maximum capacity of 4,800,000 cubic feet per twenty-four hours, but under the verbal direction of some officer of the city, whose name was not stated, except that it was not the then Mayor, the same was enlarged by the additions then and thereafter made, so that its capacity is now in the generating house 16,000,000 cubic feet; in boiler capacity about 14,000,000 cubic feet; in condensers, scrubbers, etc., about 14,000,000 cubic feet; for pumping about 18,000,000 cubic feet, and in purifying capacity about 14,000,000 cubic feet per day of twenty-four hours. From this works the city receives a daily supply of from 3,000,000 cubic feet in summer to 10,000,000 cubic feet in winter. For the year 1895 the actual amount taken was 1,694,687,000 cubic feet, as above stated, which is a daily average of about 4,643,000 cubic feet, and the evidence was that from the time the works started to the present the city has drawn from the gas company about thirty-eight per cent. of its total supply of gas, at an annual cost, as shown by the amounts appropriated, as follows:

"For the year 1890	$300,000
1891	400,000
1892	500,000
1893	600,000
1894	600,000
1895	600,000
1896	700,000
1897	750,000

The increase for the year 1896 was made by the Councils of its own motion; the department asked for an appropriation of but $600,000 for this purpose, whereas Councils appropriated $700,000. The amount actually expended was so near an approximation to the amount appropriated as to be substantially the same.

"The witnesses stated that they knew of no other contract whereby a company or city engaged in the manufacture of gas permanently purchased gas from another manufacturer.

"The allegation was brought to the attention of your Committee that some unfairness was practiced in the measurement of the gas delivered by the gas company to the city, in that it was measured while it was hot, and while its volume would, therefore, be greatest; but the testimony showed that the average temperature at which the gas was measured was 70 degrees Fahrenheit, being the same temperature at which the city estimates that its gas is delivered to the consumer; and although it seems probable from the testimony that the actual temperature at the point of delivery is only 65 degrees, yet, even so, the difference in volume would only be about one per cent.

"The cost of manufacture of the gas supplied by the gas company was variously estimated by different witnesses, but such estimates differ so greatly and are so readily increased or diminished by differences in conditions, and in the price paid for labor, material, etc., which vary considerably in different localities, that they are not altogether satisfactory. Your committee finds, however, from the testimony, that it has been established by judicial investigation that gas manufactured and delivered into the holders in Boston cost 31 1-3 cents per thousand, and in Chicago 29 cents per thousand, and that, taking into consideration the difference in labor and materials, etc., between those localities and Philadelphia, the cost to the Philadelphia Gas Improvement Company is probably 30 cents per thousand cubic feet sold to the city. In view of the fact that the plant of the gas company is much more expensive and extensive than is needed to furnish the average supply required from it by the city, and that it is frequently called upon at very short notice for excessive amounts of gas, which it keeps itself in readiness to furnish, it does not seem to your committee that the price paid for this gas can fairly be said to be excessive."

Stronger than any of the evidence drawn from the circumstances surrounding the making of this contract are the conclusions reached from a consideration of the very text of the agreement. The evidence is little short of conclusive that there must have been some powerful inducement other than the ordinary possibility of profits to induce investment under such rigorous terms, which by their very severity would seem almost unenforceable. To the average man little doubt will remain that there was a substantial agreement between those at the head of the water gas company and men powerful in city councils that the stringent restrictions on the rights of the contractors should never be enforced or that conditions should be so shaped as to make the restrictions inapplicable. That any man in the business world would be willing, without counter-guarantees, to place his property so completely in the power of another whose interests were not identical with his own, is all but inconceivable.

XII—PUBLIC LIGHTING.

Not the least important of the services performed by the gas works during the period of municipal operation and a proportionately large item in the expense account, was the public lighting. At the beginning of the period not only were the gas lights used in all public thoroughfares, school buildings and public offices furnished without cost to the city by the gas works, but the maintenance of the lights and the wages of the men engaged in cleaning, extinguishing and lighting were defrayed from the same source. On July 1, 1889, however, the care of the public lights was transferred to a separate department, but the works continued to supply gas free of charge. The amount so furnished grew steadily throughout the period ranging from one-half million to over two-thirds of a million cubic feet per annum.

This substantial service to the city is a factor not to be forgotten when forming an idea of the benefit received from the conduct of the gas works. During the period of trust management the city had paid for the gas used in public lighting.

Year.	*Amount of Gas consumed in public lighting, i. e., Gas unpaid for.*	*Value at current price.*	*Value at estimated cost of production and distribution.*
1887........	506,499,881	$759,749.82	$683,774.84
1888........	536,158,081	804,237.12	723,813.41
1889........	521,401,101	782,101.65	702,891.49
1890........	551,459,572	827,189.36	744,470.42
1891........	587,398,328	881,097.49	792,987.44
1892........	594,203,605	891,305.41	793,174.87
1893........	602,392,714	903,589.17	813,230.25
1894........	623,313,751	623,313.75	488,651.00
1895........	638,494,005	638,494.01	480,795.20
1896........	674,031,512	674,031.51	539,225.21

While considering the method of public lighting, it is important to remember that all the public lighting was not done by gas. Three kinds of light were used even in lighting the public thoroughfares, and the offices were not exclusively lighted by gas. How far the use of other means had progressed may be seen from the fact that, as stated January 1, 1896, there were then in the city 21,461 public gas lamps, of which about 4,000 were out of use because councils had provided for electric lights so near them as to render them unnecessary. It may be noticed that in doing so, councils were substituting the light of a private company, for which the city had to pay at a high rate, for public lights which were supplied free of cost. The total number of lamps in use was:

Street gas lamps..................	17,439
Street gasolene lamps................	11,538
Street electric lamps................	6,361
	35,338

In other words, the city did rather less than one-half of her own lighting and bought from private companies more than one-half of her supply. It was pointed out to the investigating committee in 1895 that the city had many more electric lights than any other municipality in the country and that a much higher rate per lamp was paid. There were charged against the Bureau of Lighting in 1895 almost as many electric lights as in New York, Chicago and Boston combined, and the price paid was $159.68 per light per year in contrast to $75 per light in St. Louis, $91 in Scranton and $96 in Chicago.[1]

It is perhaps unnecessary to point out that the prosperity of the gasolene and electric light companies would be proportionately greater, the poorer the gas service became, and that their interests were diametrically opposed to the interests of the gas works.

---

[1] The President of the Edison Electric Company testified that he would be glad to take contracts for the lights at $109, " and, if competition was lively," at $100.

This was true, of course, not only in the furnishing of the public lights but in the entire service of supplying illuminants to the people of the city. It is clear that the interests of the electric and gasolene companies would not prompt them toward giving whatever support they held in councils in favor of a liberal policy toward the gas works. Whatever may have been the influences that prompted the pennywise policy adopted toward the municipal lighting plant, there can in any case be no doubt that the interests of the independent lighting companies would tend to make them look on the crippling of the gas works as anything but a misfortune to themselves. It is also a significant circumstance that the electric light companies during the entire period of municipal ownership had a strong representation in councils. How many of the councilmen were interested in electric lighting companies, it is hard to say with exactness, as it is impossible to find complete lists of the shareholders and officers of the various companies which at that time held the electric lighting of the city in a practical monopoly.[2] The list of officers, however, so far as obtained, included many men prominent in city politics and several members of councils. In order to show how close was this connection between the electric light companies and local politics the following excerpt from the testimony before the Senate committee is printed in full:

Testimony of Mr. Arthur Lea (reported in the "Philadelphia Record," December 5, 1895).

"I have a list of the officers and directors of those companies (supplying electric light to the city), as far as it was possible to obtain them.

"The Brush Electric Light Company was organized in June, 1891, and we have been unable to secure any information as to the directors of that company later than that date. All information has been refused. The general manager of the Brush Electric Light Company is A. J. De Camp, who is a member of Common Council from the Twenty-ninth Ward.

"The directors of the Diamond Electric Light Company are Charles A. Porter, President; David Martin, William J. Latta, George A. Castor and Henry J. McCarthy.

"The officers of the Powelton Electric Light Company are Charles A. Porter; William J. Latta, President; P. P. Bowles, William S. Kimball, C. H. Clark, Jr., Samuel Crothers, William King, W. J. Moore and L. W. Moore.

"The Suburban Electric Light Company officers are: Charles A. Porter, William Miller, William J. Latta, J. W. South, H. A. Mullen and P. E. Costello. I think Mr. Costello is a member of Common Council from the Thirty-fifth Ward. He is President of this company. The other officers are: J. A. Disston, Hamilton Disston, William L. Martin, Robert Irvin and H. C. Forrest.

"The officers of the Manufacturers' Electric Light Company are: Charles A. Porter, David Martin, James Work, President; John Taylor, William J. [illegible], William Emsley, James Ritchie, Jr., William Bardsley, James McCormick.

"The officers of the Southern Electric Light Company are: J. M. Mack, President; William J. Manning, Secretary. No names of directors could be ascertained. As to the Germantown Electric Company, the information has not been obtainable at all.

---

[2] The Electric Light Companies refused to divulge the lists of their stockholders at the time of the investigation by the Senate Committee.

"The officers of the Kensington Electric Light Company are: William McIntyre, President, and Nathan Pollock, Secretary and Treasurer; and E. J. Wilkinson, Secretary.

"The officers of the Northern Electric Company, which formerly bid for this work, are Henry Clay, President; A. H. De Camp, P. A. B. Widener, L. Y. Hotchkiss, J. Lowber Welsh, William Wood, William Lawson and Henry Lewis.

"Is the President of that company a councilman from the Sixteenth Ward?

"Yes, sir; a member of Select Council from the Sixteenth Ward."

To sum up the relations of councils to the gas works and the private companies engaged in the performance of similar services, it may be said that in the making of gas, councils had entered into a contract with a private company for the manufacture of a portion of the city's supply, the works of which could at the beginning have been taken over by the city at a small cost, but which were called on for an increasing amount of gas for which appropriations were freely made by councils, in one instance exceeding by $100,000 the amount asked for by the Bureau of Gas. Again, portions of the city's plant were leased to this company by which the possible output of the municipal establishment was greatly decreased and a large portion of the better equipment forced into idleness. The contract of this private company was of such a character that it raised a strong presumption that powerful friends of the organization in councils were looked to to save the company from the operation of unusually harsh specifications in the agreement. Lastly, the by-products of the municipal part of the gas works had come to be controlled by a practical monopoly. The company to which the tar was sold was controlled by the same interests as the water gas establishment.

The electric light companies competing in the same field as the gas works had been lavishly paid by councils for the proportion of the public lighting done by them, and a portion of the city gas lamps was even discontinued to be replaced by electric lights. Two of the presidents and one general manager of the electric light companies were members of the city councils and many other prominent men in local politics held positions on the various boards of directors. The interests of the electric light companies were naturally opposed to the development of an efficient gas service and may plausibly be presumed to have worked against the granting of appropriations to make the municipal lighting plant efficient.

The action of councils in making liberal appropriations to private companies furnishing light and at the same time consistently cutting down the amounts asked for by those in charge of the municipal enterprise could not but have the result which it brought. The crippling of the gas works for the benefit of the private companies and the debauching of the management by the forced employment of political favorites could lead to but one result, the abandonment of the enterprise by the municipality.

XIII—PROFITS.

The evidence up to this point has shown to what extent the efficient management of the works was hampered by the shortsighted policy of councils in the matter of extensions and distributing system. This was not by any means the most serious feature in the local situation. A far more important factor was the set purpose of councils to exploit the works by using the gross profits for general city purposes, thus keeping the tax rate relatively low. The officials in charge of the works made constant and persistent efforts to modify this ruinous policy, but to no purpose.

During the trust period, as already stated, all moneys expended on the laying of mains, extension of works and similar purposes, were charged to the capital account and profits were reported for years when the actual result of operation was a deficit. It has also been pointed out that under the city this plan was changed and all amounts paid for extensions, improvements and repairs were charged to current expenses. This fact must be kept in mind when it is stated that no depreciation fund was provided, as the expenditures for repairs and mains at least partly covered the depreciation of the plant. Further, it should be noted that the creation and maintenance of a sinking fund under the trust management does not mean, as is popularly supposed, that a depreciation account was kept at that time. The sinking fund, as we have seen when discussing the subject of gas loans, was only designed for the liquidation of such loans and had no reference to the ultimate renewal of the plant. In fact, the practice was the same on this point in both trust and municipal management—repairs, improvements and extensions were in neither case provided for by a depreciation account. In the case of the trust, such expenses were charged to capital account; under municipal management, to current expenses. The plan adopted by the city management was not, however, founded on good business principles. The repairs in the distributing system, had they been carried out as planned by the chief of the Bureau of Gas, would have fulfilled in part the purpose of a depreciation fund, but no such plan would have been adequate even if carried out in the manufacturing department.

The failure to provide for the renewal and improvement of the manufacturing plant was the most serious indictment against the policy of councils. This was, however, strictly in line with the general policy of the local legislative body, to get as much out of the gas works and put as little in as possible. As we have already seen, the appropriations of councils for the general maintenance of the works were entirely inadequate. After deducting these amounts from the gross profits of the works, the entire balance was turned into the municipal treasury to be used for general city purposes. This policy was due to the anxiety of councils to avoid an increase in the general tax rate. Taken in connection with the expenditures for lighting other than gas, we find this curious situation. Councils made insufficient appropriations for the gas works, but made generous contracts with private lighting companies. They appropriated the profits of the gas works to pay for the services performed by the favored corporations. The policy was in a word one of cutting off the producing power of the municipal plant at one end and increasing the competing power of its rivals at the other.

The nominal net profits of the gas works, as reported by the officials, grew steadily from $424,838.01 in the year 1887, the first year of municipal management,[1] to $1,037,642.36 in 1893.

In 1894 there was a deficit of $353,575.80 on account of the reduction in the price of gas from $1.50 to $1.00 per thousand cubic feet; in 1895 a surplus of $51,843.42, and in 1896 a deficit of $87,940.48. Taking the period as a whole, the municipal operations show a profit over all expenditures for improvements and extensions of over $5,000,000, all of which was turned into the city funds and used in keeping down the general tax rate. This amount of money turned over represents profits in one sense but can hardly be received as a fair indication of what the works should have netted the city. A large part, probably all, should have been used to keep the works at the highest degree of efficiency. It is clear, also, that if the quality of the gas had been improved there would have been a steady increase in the demand and a correspondingly greater profit to the city from operation. This policy of exploiting the works for general city purposes must always be kept in mind in judging the period of municipal operation.

Under any rational system of accounting not only should a large percentage of these so-called profits have been used for repairs and renewals, but a portion should have been handed over to other city departments which were performing part of the work of the Gas Bureau. The collection of bills and the auditing of accounts which, in a private company, would be borne by the works, was done by the receiver of taxes and the city controller respectively. Further services were rendered by the Bureau of Lighting and the Bureau of City Property, all expenses which should have been charged against the gas works.

The table on page 631 contains a list of the additional items which should have been charged against the Bureau of Gas and enables us to form a clearer idea of real as against fictitious profits.

From this table it will be seen that under a modern system of accounting the reported profits of $5,062,533.50 during the years 1888 to 1897 inclusive would have been reduced to $2,937,719.56. To what extent even this amount can be regarded as "profits" can best be judged by a review of the efforts made by the officials in charge of the works to induce councils to enable them to increase the efficiency of the plant.

---

[1] See following table as to the real condition in the first year of management.

Year.	Gross Profits.[2]	Expenditure for Permanent Improvements on Works.	Expenditure for Extensions. New Mains.	Expenditure for Extensions. Service Pipes.	Excess of Profits Used for Other City Purposes.	Excess of Extensions and Improvements over Profits.
1887	$684,356 90	$93,175 00	$85,021 82	$81,322 07	$424,838 01	....
1888	781,012 80	128,568 32	163,576 36	91,059 71	397,808 41	....
1889	1,240,403 15	276,386 39	110,848 59	96,779 68	726,388 49	....
1890	1,331,019 41	136,642 17	258,150 63	105,580 70	830,645 91	....
1891	1,441,308 61	91,550 68	256,121 30	100,675 83	992,960 80	....
1892	1,425,789 12	133,629 00	149,305 34	100,932 40	1,041,922 38	....
1893	1,459,069 37	202,243 47	111,608 51	107,575 03	1,037,642 36	....
1894	192,310 81[3]	324,616 12	102,364 97	118,905 52	....	$353,575 80
1895	284,589 56	3,100 00	115,773 03	113,873 11	51,843 42	....
1896	352,988 80	242,309 53	80,637 88	117,981 87	....	87,940 48
	$9,192,848 53	$1,632,220 68	$1,463,408 43	$1,034,685 92	$5,504,049 78	$441,516 28

---

[2] During the decade of 1887-1897 the excess of gross profits over expenditures for improvements and extensions was $5,010,890.08.

[3] Price reduced from $1.50 to $1 per 1,000 cubic feet of gas.

Surplus and Deficit of the Philadelphia Gas Works, 1888-1897.

Disbursements.	*Page.**	1888.	*Page.**	1889.	*Page.**	1890.	*Page.**	1891.	*Page.**	1892.
Bureau of Gas......	74	$3,321,962 74	90	$2,851,019 51	89	$2,806,551 42	95	$2,826,274 70	100	$2,811,899 54
Rec. of Taxes (Coll. of Bills).........	123	32,370 20	154	61,050 91	150	61,066 83	153	62,379 19	163	63,514 40
City Controller (Auditor)	134	8,250 00	127	4,000 00	122	6,000 00	125	6,000 00	133	6,000 00
Bureau of Lighting (Street Lamps)...	..	....	103	69,433 02	99	182,065 95	105	149,394 78	110	163,300 60
Bureau of City Property (Rentals)....	..	....	..	....	..	....	69	6,300 00	73	6,300 00
Total Disbursements	..	$3,362,582 94	..	$2,985,503 44	..	$3,055,684 20	..	$3,050,348 67	..	$3,051,014 54
Total Receipts....	18	3,750,569 89	20	3,658,295 09	18	3,659,898 88	19	3,747,996 75	18	3,845,989 27
Profit or Loss...	..	$387,986 95	..	$672,791 65	..	$604,214 68	..	$697,648 08	..	$794,974 73

Disbursements.	*Page.**	1893.	*Page.**	1894.	*Page.**	1895.	*Page.**	1896.	*Page.**	1897.
Bureau of Gas......	104	$2,990,632 26	104	$3,280,352 89	102	$3,040,103 44	101	$3,525,216 11	101	$2,915,983 97
Rec. of Taxes. (Coll. of Bills).........	177	69,705 97	187	73,095 60	173	73,571 06	171	73,192 37	172	68,220 51
City Controller (Auditors)	142	6,000 00	142	6,000 00	135	6,000 00	135	6,000 00	138	6,000 00
Bureau of Lighting (Street Lamps)...	118	182,705 81	117	189,105 97	114	189,571 52	115	189,953 08	115	181,094 13
Bureau of City Property (Rentals)....	74	11,387 60	73	12,424 00	74	12,424 00	74	12,424 00	74	11,388 66
Total Disbursements	..	$3,260,431 64	..	$3,560,978 46	..	$3,321,670 02	..	$3,806,785 56	..	$3,182,687 27
Total Receipts....	17	4,022,128 41	39	3,143,604 79	40	3,121,983 18	44	3,318,337 71	39	3,306,602 33
Profit or Loss...	..	$761,696 77	..	†$417,373 67	..	†$199,686 84	..	†$488,447 85	..	$123,915 06

---

* City Controller's Report.

† Deficits.

XIV—THE STRUGGLE FOR IMPROVEMENT.

The most difficult problem confronting the public officials entrusted with the management of the gas works was to secure from councils the appropriations necessary to bring the method of manufacture and the distributing system to modern standards of efficiency. Year after year the chief of the Bureau of Gas, the director of public works and the mayor called attention to the imperative needs of the system, only to be refused with the same regularity by councils. To show how earnestly and persistently the officials responsible for the works plead for the modernizing of the plant and distributing system and how consistently their requests were disregarded by councils, we will quote at some length from the annual reports of the respective departments.

In 1888, the year following the inauguration of responsible municipal control, Mayor Fitler urged upon councils the modernization of the plant in the interests of economy and efficiency.

"The city's works," he said, "failed to satisfactorily meet the increased demand for gas during the past winter months. In order to make the whole plant economical and bring it up to a high standard of efficiency, it should be equipped with the latest improvements. All the bids made by the different parties who desired to buy or lease these works last year contained provisions for the expenditure of a large amount of money for remodeling the plant, showing conclusively their opinion of the condition of the same. The Gas Ordinance just passed will, if an acceptable bid is made, give us an increased quantity, but for its storage and distribution we require new gas holders at the works, and also in different sections of the city, as well as mains through which to deliver it properly to the consumers."

Already the chief defects of the city management had become evident. Councils had adopted a partial measure instead of going to the root of the difficulty. An increase had been provided in the manufacturing department without a corresponding improvement in the other portions of the plant. Such appropriation was at best bound to fail of the results it should accomplish, for the handling of the gas after manufacture was quite as important as its manufacture. The inadequate and defective distributing facilities inherited from the gas trust were, it seemed, to be perpetuated. In spite, however, of this handicap, the officials in charge of the works were able during the first three years of their management to make a very creditable showing as compared with the period of irresponsible trust management. Mayor Fitler, discussing this period, said in 1890:

"The candle power of the gas furnished during the last year was much above that of any previous year. In 1887 it was equal to 17.65 candles; in 1888 to 18.54 candles and in 1889 it equalled 20.07 candles * * *.[1] With the $581,312.58 appropriated during the years 1887, 1888 and 1889 for these purposes (improvements) we increased our manufacturing capacity seven million cubic feet per day; and the illuminating power of the gas 2.42 candles; the storage capacity three million cubic feet; about one hundred miles of pipe were laid and the cost of manufacture and distribution of the gas was reduced from $1.40 for one thousand cubic feet to 80 cents per thousand cubic feet."

---

[1] Mayor's Message, 1890, Vol. III., page 9.

In 1891 the mayor stated:

> "The Bureau of Gas is now managed on strictly business principles and the good result is manifest in the increased earnings paid into the treasury. A few years more of such careful management and the additional improvements recommended will make this the best paying gas plant owned by any city in the world."[2]

These hopes for the future were doomed to disappointment, however, for whatever improvements might be made in management in certain portions of the works no permanent advancement could be made without a thorough overhauling of the works, and for this councils continued to refuse appropriations. That this fact became more and more evident to the mayor is shown in his messages for the succeeding years, passages from which are as follows:

> "Nothing has been done during 1892," said James H. Windrim, Director of Public Works, in his Annual Report, "to increase the facilities for manufacturing gas, further than the reconstruction of wornout benches, substituting those of more modern pattern and with partial machine labor, and additional purifying apparatus."[3]

In 1894 Mayor Stuart in his annual message said:

> "I most heartily concur in the recommendation of the Director of the Department of Public Works that you further appropriate money to make all the improvements necessary to thoroughly equip our gas system in every detail with the latest, best and most approved scientific appliances and methods it is possible to secure."[4]

In 1896 Mayor Warwick in his first annual message said:

> "In order to keep these gas works up to a proper standard it will be necessary to make greater improvements not only in the manufacture, but in the distribution of the gas, and these improvements will compel a large expenditure of money. The gas is not of the quality that it should be and there is no need of concealing the truth; it will not be until the necessary improvements are made that will enable the Bureau to manufacture and distribute a better illuminant."[5]

In his second annual message he said:

> "The plant is valued at about $30,000,000, close to the actual debt of the city at this time, and money will be well expended if the changes suggested are carried out * * *. In order, however, to bring the city's plant to a proper standard, it will be necessary that large sums of money be expended not only in the introduction of additional improved and modern machinery for the manufacture of gas, but in the laying of new and larger mains for its proper distribution and for the further increase of the holder capacity.
>
> "The gas manufactured by the Philadelphia Gas Works is equal in quality with that made in any city in the Union. In other words, the gas in the holder before distribution is a good illuminant of the necessary candle power, but, unfortunately, by reason of our method of distribution, when it reaches the consumer it has lost much of its illuminating quality. This is not due to any fault of the gas itself,

---

[2] Mayor's Message, 1890, Vol. III., pages 12, 13.

[3] Annual Report of the Department of Public Works, dated Philadelphia, January 2, 1893, Vol. III., 1892, pages 39, 40 (James H. Windrim, Director).

[4] Third Annual Message of Mayor Edwin S. Stuart, dated Philadelphia, April 2, 1894, Vol. III., 1893, page 16.

[5] First Annual Message of Mayor Charles F. Warwick, dated Philadelphia, April 6, 1896, Vol. III., 1895, page xvi.

but to the inefficient and insufficient methods of distribution. The gas has to be forced by great pressure through many miles of small sized or inadequate mains; and by reason of this great pressure the candle power is necessarily reduced, because of the excessive friction to which the gas is subjected; it is thereby robbed of its hydrocarbon, which is its light-giving quality. This matter of distribution should be taken up and considered with the greatest care, and perhaps it would be advisable, under all the circumstances, to have an estimate made of the cost that would be involved in effecting the desired changes. Plans should be drawn showing the location, the capacity and the life of the mains, in order that this work may be done systematically and economically. For instance, in one section of the city leading from the gas works to supply a certain locality years ago a three-inch main was laid, which was in that day considered of sufficient size and capacity, but as population increased and passed beyond the limit of the original calculation, it was necessary to further extend the main, and a six-inch main was added, and subsequently, to supply the still growing demand, an eight-inch main was laid; thus we have three different sized mains joining each other and used for the purpose of distributing gas, when in truth and in fact a twenty-inch main for the proper distribution of gas in that locality is absolutely required. The fault does not lie in the manufacture of our gas, which is produced from the best coal that can be purchased for the purpose and with the application of scientific methods, but in the inadequate and insufficient means of distribution, and until better methods be adopted there can be but little if any improvement."[1]

The criticism of the distributing system was only just, although as is shown in another part of this paper, the opinion passed upon the methods of manufacture presents the case more favorably than the facts justified.

The recommendations of the chief executive were, of course, drawn from a less intimate knowledge of the actual needs of the service than were those of the officers more directly in charge, namely, the director of the Department of Public Works and the chief of the Bureau of Gas. The needs of the various branches of the service at the time the city took charge in 1887 have already been discussed in the consideration of the condition of the plant when turned over to the city by the trust. The continual requests for improvements during the subsequent years are thus outlined in the reports.

In 1888 the chief of the Bureau of Gas stated:

"In the absence of an increase in the manufacturing capacity during the year, the works were forced to an extent to which I trust it will not be necessary again to subject them. That there was no stoppage in the pipes at the Ninth Ward Works during that period must be attributed to naphtha, the use of which was begun in 1887, and it seems that the introduction of naphtha, sparingly, solves the vexed question of stopped pipes in immediate connection with the works.

"In the last report some space was devoted to the cause of the numerous complaints then being made by consumers of an insufficient supply of gas in the early hours of the night, and the result of this year's operations in that direction is in support of the assertion that large feeders would be the remedy.

"With these additional feeders we will be safe, so far as those quarters of the city are concerned, for some time to come, from the perplexing position in which a gas engineer finds himself with too small reservoir capacity to fill the small pipe from which the consumers are directly supplied.

---

[1] Second Annual Message of Mayor Charles F. Warwick, dated Philadelphia, April 5, 1897, Vol. III., 1896, pages xii-xiv.

"With the proposed large mains in the lower section of the city and the new holder at Ninth and Mifflin streets, a necessity will exist for increased manufacturing facilities at the Twenty-sixth Ward Works. I have for several years called attention to this want, and again ask consideration of the subject.

"I again urge the importance of greater condensing surface at the Ninth Ward Works, so that the gas may enter the purifiers at a lower temperature than at present. This can be accomplished by duplicating the main now suspended around the retort house. I hope it will not be necessary to pass as much gas through the pipes again as we were compelled to do during the latter part of the year, without an increased condensing surface."[7]

In his annual report for 1889 the chief of the Bureau of Gas stated that:

"Unless the proportion of feeders is considerably increased, it would be well to call a halt in the matter of laying three and four inch pipe, as every additional line of these small sizes serves to interfere with the supply to the present consumers. In this connection your attention is directed to the advisability of replacing the small main pipe in certain sections of the city with larger pipe. These small mains were for a time equal to the demand; but, with the enlargement of business places and other establishments, and a consequent increased demand for gas to properly light them, the small pipe is now taxed to the utmost. If this capacity is not enlarged we may naturally expect to hear complaints of an inadequate supply, especially during the early hours of the evening.

"There is necessity for continuing the line of the 30-inch main already laid as far as Broad and Mifflin streets to the vicinity of Erie avenue, which will assist in maintaining a regular supply of gas in all parts of the city. It is to be hoped that you will be able to procure the means for the laying of this main at an early day."[8]

In the annual report of the director of public works for 1889 he insists that it should be borne in mind:

"First—That this department cannot spend a dollar, no matter what the earnings of its several bureaus, until it has been appropriated by councils, and then only for the specific purpose for which it is appropriated.

"Second—That the total amounts asked for in the annual estimates of the department have always been reduced, and that, therefore, extensions of works of the greatest importance to the people of Philadelphia cannot be made. (These reductions amount to $1,919,080 in the appropriation for 1890.)

"Third—That when the present administration assumed control of the city's gas works, they were found in a condition which would have justified the immediate expenditure of several millions of dollars in the rebuilding of stacks, the construction of gas holders and the laying of large mains, but that the total amount expended during the years 1887, 1888 and 1889 for these objects was just $581,312.58.

"Fourth—That with this sum the manufacturing capacity has been increased 7,000,000 cubic feet per day; the holder capacity 3,000,000 cubic feet; the new pipe laid amounts to 99½ miles, more than one-tenth as much as was laid during the preceding fifty years; that the candle power of the gas has been increased 2.42 candles—nearly fourteen per cent.; that the cost of manufacture and distribution has been reduced from $1.40 per 1,000 feet for the three months preceding the advent of the present administration to eighty-nine cents per 1,000 feet in 1889; and that the number of men employed has been reduced from 2,257 to 1,518.

---

[7] Report of the Chief of the Bureau of Gas, 1888, pages 114, 119, 120.

[8] Report of the Chief of the Bureau of Gas, 1889, pages 127, 128, 135.

"Under all these circumstances, how can it be hoped, much less expected, that somebody has not been materially injured, either in the loss of profits heretofore enjoyed, or in the non-receipt of profits anticipated when the city would be ready to abandon her ownership of this most valuable property; and that this somebody is satisfied that the gas is very bad, and that he says so or has someone say so for him?"[9]

The chief of the Bureau of Gas in his annual report for 1890 said:

"An appropriation sufficient to lay an increased number of the larger mains in 1891, with a view to keeping the enormous amount of small pipe supplied with gas at all times, was looked for, and it is to be regretted that the sum named in your estimate for that purpose could not be provided. The rapid increase in the number of dwellings and the consequent extension of small pipe to furnish the new consumers with gas, make it necessary that the feeding capacity should be materially enlarged, and it would be true economy to put down all the feeders needed, inasmuch as everybody would receive the gas required, and necessarily the revenue to the city would be greatly increased.

"So many complaints of the odor of gas having arisen from wornout services, induce the suggestion that it would be well to recommence the work begun several years ago of renewing the service pipes in those parts of the city where they were put in many years ago. It was a profitable investment then and it will undoubtedly prove equally as profitable now."[10]

In his annual report for 1890 the director of public works says:

"The supply of gas in the city west of the Schuylkill river should be increased. The citizens have just cause for their complaints. Storage capacity is badly needed there, and a holder with the necessary buildings and machinery should be built in the low ground attached to the Blockley Almshouse, and large mains needed for the proper distribution should be laid. This should receive your early attention.

"As water gas has now been tested and approved in almost every city of any prominence in this country, I recommend that a plant be erected at the Point Breeze Works, of the same capacity as the one at the Twenty-fifth Ward Works. The city should own both these plants. The manufacture of gas at Market and Twenty-third streets could then be abandoned and the holder capacity at that location increased.

"With this improvement completed and the large mains necessary for a proper distribution laid as recommended in the Director's report, the city's gas plant will be in excellent condition to show a large increase over present earnings, even after estimating interest on the money expended upon it * * *.

"Pipe Laying.—With sufficient manufacturing capacity and increased, but still insufficient, storage capacity, improvement of the distribution, by the laying of large mains, has been the most important question. It is, therefore, of importance that large mains be laid as feeders, and also for the proper regulation of the pressure. This becomes still more important because of the absence of gas holders from many portions of our city."[11]

---

[9] Report of the Director of Public Works, 1889, Vol. III., pages 24, 25, 26.

[10] Annual Report of the Chief of the Bureau of Gas, 1890, pages 133, 134, 138.

[11] Report of the Director of Public Works, 1890, page 14.

In 1891 the director reports that, due to the purchase of gas from the Philadelphia Gas Improvement Company, a sudden increase in demand could be met, which "would have required days for stacks of the coal plant" to accomplish.

In his annual report for 1891 the director of public works says:

> "It is imperative for the city to extend its plant for the manufacture of the entire quantity of gas required by the consumers. The amount of consumption is increasing with the growth of the city, and if the department is to supply all of the gas manufactured by the city appropriations should be made to construct additional works, or the city must continue to purchase gas in the manner already instituted from a private corporation.
>
> "The city should own its entire plant, increasing its capacity to supply the public, and in doing so adopt the improved methods for the manufacture of gas which science and business enterprise have proven efficient, in order to supply satisfactory illuminating and fuel gas at the lowest possible price to the consumer.
>
> "With such improvements made, there can be a reduction in the price of gas; with that reduction there would naturally be a greater consumption; but the city is not at the present time in a condition to do either—make the reduction in price or make the additional gas.
>
> "The department suggests that means be provided to establish a plant by the city for the manufacture of at least six million cubic feet of water gas per day."[12]

In his annual report for 1891 the chief of the Bureau of Gas says:

> "This ability of the water gas plant to increase the supply also enabled us to get along during the fall and winter months without the Twenty-first Ward works, which has always been a source of expense when in operation without corresponding profit."[13]

In 1892 the same official makes the following recommendation:

> "I would most respectfully urge that immediate attention be given this subject, the laying of mains, because it will take two or three years to lay this main, which will be several miles in length, unless an adequate appropriation can be made at one time.
>
> "The greatly increased demand for gas during the period of heavy consumption over that of the corresponding months of the preceding year is proof of the urgent necessity existing for additional manufacturing capacity and the means of getting the gas once made into the street mains. Replacing two old stacks with improved benches at the Point Breeze works, for which provision has been made in the appropriation bill of 1893, will tide us over next winter; but in the interim something should be done looking to an increased make.
>
> "It would not be advisable to add to the manufacturing plant unless provision is made to get the increased make to the central and remote portions of the city.
>
> "To this would be added, if there were sufficient money, the substitution of a new shell for one of the holders at the Twenty-fifth and Callowhill streets station, now by reason of age practically useless."[14]

The director of public works in his report for 1892 says:

> "From the aggregate of all the retorts for making gas from coal, the maximum quantity it is possible to make, if all parts of the plant are in perfect condition and could be maintained so, would be 16,800,000

---

[12] Annual Report of the Director of Public Works, 1891, page 29.

[13] Report of the Chief of the Bureau of Gas, 1891, page 86.

[14] Report of the Chief of the Bureau of Gas, 1892, pages 6, 9, 10, 11.

cubic feet in twenty-four hours. On account of antiquated benches, renewals, repairs and other contingencies, the working output is about 12,000,000 cubic feet in twenty-four hours. The greatest consumption in the city in any one day in 1892 was 16,328,000 cubic feet; the works owned by the city are short in capacity 4,328,000 cubic feet per day of the supply needed, and this quantity may be greater if the supply of coal be inadequate, or accident occur to the retort benches.

"The deficiency will increase each year, as the city grows, by additional consumers, the increase of business industries in number and in their requirements.

"Nothing has been done during 1892 to increase the facilities for manufacturing gas, further than the reconstruction of wornout benches, substituting those of modern pattern and with partial machine labor, and additional purifying apparatus.

"The department has suggested that money be appropriated to purchase the present plant of the Philadelphia Gas Improvement Company at the Twenty-fifth Ward works, and to erect at the Twenty-sixth Ward works a plant to manufacture at least six million cubic feet of water gas per day, complete in all its appointments, with an additional holder of 3,000,000 cubic feet capacity, with exhausters and the additional mains for distribution to the other holder stations; these improvements are estimated to cost about $1,000,000, and as additions to the works should be planned and constructed to form a part of any future extensions.

"If the city does not provide the additions to make the gas required, there will have to be made each year an increase in the appropriations for the purchase of water gas."[15]

The department also requested an appropriation for increasing the capacity of one of the holders at the Twenty-fifth Ward works, which was not granted.

The chief of the Bureau of Gas in his report for 1893 says:

"Considerable work had been laid out for 1894, looking to bringing the distributing facilities up to the manufacturing capacity; but, at the time this report was closed no appropriation for these improvements had been made."[16]

The director of public works in his report for 1893 says:

"There has been no increase made to holders at either of the city stations.

"The department submitted its annual estimate for the amount of appropriations required for extensions to the plant at the several works of the city, and for the introduction of modern, improved appliances, that the cost of manufacturing gas could be reduced to the lowest price; the estimate for the requirements of the several works and for the extension of mains was $1,080,500; the Committee on Finance reduced the amount to $250,000, and this latter amount has not yet been appropriated.

"To obtain the best results from the city's works there should be now provided at Point Breeze two exhaust engines and exhausts, four additional boilers, additional sponge shed, two station meters, repair to station meter, one holder of 3,000,000 cubic feet capacity, and a thirty-six inch distributing main from Point Breeze to the Ninth Ward works; at the Ninth Ward works two exhaust engines and exhausts, boiler house and boiler, and one holder increased in capacity 500,000 cubic feet; at the Twenty-fifth Ward works two stacks of Flemming benches, instead of primitive stacks, for making gas from coal, one station meter, one holder increased in capacity 500,000 cubic feet; at the Twenty-first Ward holder station one holder increased in capacity 150,000 cubic feet, one twenty-inch main from the Twenty-fifth Ward works to Chestnut Hill; the estimated cost of these improvements to the works is $1,080,500.

---

[15] Report of the Director of Public Works, 1892, pages xxxviii xl.

[16] Report of the Chief of the Bureau of Gas, 1893, page 94.

"It must be here stated that these additions are required now, and are necessary, whether further additions to the city's works are made to manufacture gas from coal or by water gas plant.

"There are proposals made by parties to build works and furnish gas under their patents to the city at lower rates than the city is now either purchasing or manufacturing gas.

"While such offers should be noticed, it is proper to consider what may be disadvantages to the public should a private corporation control the supply of gas which, for its usefulness and adaptability for convenience in the household and for business, makes it a necessity to the community of continually increasing importance.

"The ownership of works and the manufacture of gas should be reserved and controlled by the city, and, if the improvements and additions that have been suggested from time to time by the department are authorized by councils, the gas works under control of the city can be made as beneficial to the taxpayers as any offer of purchase or lease may appear to be."[17]

The chief of the Bureau of Gas in his report for 1894 says:

"Complaints of a short supply of gas were numerous, and, unfortunately, they came from localities where the remedy could not be applied. Attention has been frequently called to an inadequacy in the means for distributing gas into these particular sections of the city without response from the money-giving branch of the municipal government.

"The figures in the leakage account have assumed unusual proportions, the responsibility for which rests with the many thousands of services not in use, with the renewal of main pipe and services along the route of the trolley lines of railways, with the numerous breaks in main pipes which resulted from the introduction of other street improvements, and with the condensation in the mains, the result of excessive friction following an increased pressure necessary to get the gas into and through the nearly nine hundred miles of small pipe lying in the street. Even with the pressure carried it was utterly impossible to supply the demand, and this condition must continue so long as the request for large mains is unheeded.

"Estimates were furnished for considerable work to be done in 1895, with a view to relieving the sections of the city wherein there is an insufficient supply of gas, but with the close of the year no appropriation had been made for these improvements.

"This work of increasing the holder capacity, particularly at the Twenty-fifth Ward works, has become a prime necessity, in order to enable us to accommodate the demand for a larger make of gas at that point, occasioned by the erection of thousands of new buildings in the northern part of the city. As it is at present the make is limited to a quantity of much less than the manufacturing capacity and the demand by the consumers. It was a fact during the last two months of the year that, with sufficient holder capacity at these works, one million cubic feet a day more could have been disposed of."[18]

The director of public works in his report for 1894 says:

"The holder capacity is still insufficient for the demands of the city.

"Suggestions have been made by the department of the additions required at the city's works, some of which are absolutely necessary to utilize improvements that have been made, and which cannot be put into use until the further additions are completed, to wit, by an increased holder capacity and additional large distributing mains.

---

[17] Report of the Director of Public Works, 1893, pages 36, 37, 38.

[18] Report of the Chief of the Bureau of Gas, 1894, pages 58, 59, 63.

"If the extensions suggested had been authorized the department would have been able upon their completion to provide the additional demand for gas from the city's works.

"The increasing percentage of leakage each year is due to the insufficient size of many of the distributing mains, which are extended in length from year to year, as the growth of the city makes it necessary to supply gas in new territory; to reach these extreme distances requires greater pressure at the works or holder stations, which increases condensation in the pipe lines and forces leakage from joints which might not leak under less pressure.

"This condition implies that additional holder stations would shorten the distance that gas has to flow in supplying specific districts.

"The minimum percentage chargeable to leakage will be obtained when mains are of adequate size to deliver the amount of gas required with the least resistance, at the lowest pressure and with the joints in the pipe lines kept free from leaks.

"One million cubic feet more of gas could have been disposed of per night during the last two months of the year had the holder capacity been sufficient."[*]

The chief of the Bureau of Gas in his report for 1895 says:

"It was again demonstrated that the Bureau was equal to the task of making all that was required, and it was also again demonstrated that the Bureau was unequal, by reason of the inadequate means for storing and carrying, to the task of supplying all that needed by the consumer. We hope for some relief in this direction during the coming year, by the construction of a 3,000,000 cubic feet holder at Point Breeze works and an additional section to the holder at Germantown, but the full effect of these improvements will not be experienced until the two large mains which have been urged for several years—one from the Point Breeze works to the Ninth Ward works and the other from the Twenty-fifth Ward works to Chestnut Hill—are put down, and sections added to the holders at the several stations not already supplied with third lifts.

"Several contemplated improvements for 1896, including the means for giving a greater supply of gas west of the Schuylkill river and to the eastern side of Germantown and to the vicinity of Chestnut Hill, have been repeatedly urged, but councils have not as yet seen their way clear to provide the money. The complaints from these several sections of a short supply have been on the increase during the year, and they will be naturally added to, with the increasing tendency of the people to get to the outskirts."[*]

The director of public works in his report for 1895 says:

"While the figures in the leakage account are not quite so great as they were during the previous year, they are still of unusual proportions. That they remain so is attributable to wornout services, numerous breaks in the distributing mains, incident to the continued work on the highways, and to condensation, due to friction caused by increased pressure necessary to get the gas into and through the many hundred miles of small mains, insufficient in size and distributed all over the city.

"This matter will not be remedied to any great extent until councils provide for replacing these small mains with others of larger size.

"The section which embraces the upper portion of the Twenty-second Ward and Chestnut Hill cannot be sufficiently supplied with gas until a twenty-inch main is laid from the Twenty-fifth Ward works to

---

[*] Report of the Director of Public Works, 1894, pages 30, 31, 33.

[*] Report of the Chief of the Bureau of Gas, 1895, pages 63, 68.

Chestnut Hill. The laying of this main has been repeatedly recommended and urged by my predecessor.

"Attention has frequently been called to the necessity for additional large distributing mains into particular sections of the city."[21]

The chief of the Bureau of Gas in his report for 1896 says:

"While, by reason of the introduction of improved machinery at the Twenty-fifth Ward works and the addition of a third lift to the holder at Germantown, there was an improvement in the matter of getting the gas away from the works on the Delaware, much more could have been disposed of had there been more facilities for storing and distributing.

"The importance of an early continuance of the large main started a few years ago, to connect the Twenty-fifth Ward works with Chestnut Hill and the intervening territory, was again demonstrated. During the period of heaviest consumption it was simply impossible to meet the demand upon the distributing system in that district—the service was inadequate to furnish anywhere near a satisfactory light at the time of night it was most needed.

"With the large mains, which have been urged for quite a while past, and the renewal and telescoping of holders at the several stations. all of which are enumerated later on, the bureau will be in condition to give a sufficiency of gas for some years to come, but until that work is accomplished complaints from all directions of a short supply may be expected.

"Attention has been heretofore directed to the 'leakage' account, and many of the prominent causes have been enumerated, viz.: the great extent of pipeage, now over 1,200 miles, with the thousands of turns, angles and the very many heavy street grades to be overcome by pressure in forcing the gas that it may reach remote points, resulting in excessive friction and its natural consequence, condensation, which is, beyond doubt, the leading item in 'accounted for' gas; the many unused service pipes originally laid in anticipation of gas being introduced into new buildings, or which lie idle because tenants have ceased to be customers; the thousands of wornout services not renewed, for the reason that money has not been at hand for such work; the frequency with which the roadways have been of late years torn up, for the introduction of other street improvements, and with the result of broken gas pipes, many of which go undiscovered for quite a little while, and the sudden changes in temperature, from hot to severe cold, when repair gangs are kept busy hunting for breaks caused by upheaving frost.

"To these can be added another very fruitful contributor—defective meters. Information that a meter registers 'slow' rarely reaches the bureau by way of the consumer; it is when, by comparison, it is ascertained that there has been an increase in his bill, that he puts in an appearance, and in a large proportion of such cases the city has been found to be the loser. The 'slow' meter only comes to the front when the inspector makes his examination visit—once a quarter—and then no notice seems to be taken, except in marked cases.

"Private companies find it profitable to test meters every five years, while, as a rule, a meter that has done duty for ten years is relieved from further service. Neither of these customs has obtained here, because of the absence of the requisite means.

"I have been, and am still, engaged in an effort to keep this item (leakage) within reasonable bounds. Without an appropriation for overhauling services, meters and street mains, there is no question that it will be reduced, but, on the contrary, increased."[22]

---

[21] Report of the Director of Public Works, 1895, pages 9, 10.

[22] Report of the Chief of the Bureau of Gas, 1896, pages 63, 64, 68, 69, 70.

The director of public works in his annual report for 1896 says:

"The increased amount of leakage or unaccounted for gas each year is due to the insufficient size of many of the distributing mains, which are extended in length from year to year, as the growth of the city makes it necessary to supply gas in new territories. To force the gas through the small mains and reach these extreme distances requires greater pressure at the works or holder stations. To secure a proper distribution of gas we should carry at the works not over two and five-tenths (2.5) water pressure; but in order to meet the demand and supply gas to some sections of the city we are compelled to carry as high as four and nine-tenths (4.9) pressure; this excessive pressure increases condensation in the mains, and in many cases forces leakage at joints, which probably would not leak under less pressure.

"The condition of our gas plant to-day implies that additional holder stations should be located in other sections of the city, so as to equalize the pressure, and that the mains should be sufficiently increased in size, so as to pass freely the volume of gas required in any section of the city with the least pressure at the works or holder station; and the minimum percentage charged to leakage will only be obtained when mains are of adequate size to deliver the quantity of gas required with the least possible resistance at the lowest pressure.

"Small and insufficient mains are responsible for the unsatisfactory quality of gas furnished our citizens, and which will not be remedied until councils provide by appropriation for laying larger mains for distributing purposes, and for establishing new holder stations in various parts of the city, that the distribution of gas to all sections shall be at the lowest pressure possible.

"The fault is not in the quality of the gas manufactured, but in the system of distribution; this was again demonstrated during the last year. At the period of the heaviest consumption it was utterly impossible to meet the demands upon the distributing system in West Philadelphia, Chestnut Hill and other outlying districts; the service was absolutely inadequate to furnish anywhere near a satisfactory quantity of gas at the time of night when it was most needed."[23]

The quotations have been given at length for in no other way can the difficulties against which the Department of Public Works had to struggle be so clearly presented. They show the real cause of the failure of responsible municipal management to meet expectations. The contentions as to the necessity for increased holder stations do not appear to be so well justified as the complaints against the inadequacy of the distributing system as a whole. Indeed the Senate Committee in its investigations in 1896 found "that the holder capacity of the city's plant is * * * fully up to the quantity stated by experts to be needed for a works of fair average production." That the distributing system as a whole, however, was inadequate and defective is beyond dispute, as is proven not only by the statements quoted above, but by the extensive alterations necessary to put the plant in efficient condition when it was taken over by the United Gas Improvement Company in 1897, as elsewhere shown in this report. To be sure, this was by no means the only element which brought the city to the resolution to lease the works. As has been shown, there were abuses in almost every branch of the operation. The purchase of coal and of residual products were each under the control of favored individuals; the wages account was padded with incompetents. All these were important factors in paving the way for the leasing of the works. It is unquestioned that there were leaks in the management of the gas works at other points than the distributing system; it is true that the labor account was debauched, and it is certain that in the purchase and sales departments there were influences at work which were harmful to the city's interests. But the loss through such sources was inconsiderable when compared with those inflicted by councils in the senseless blocking of the way to improvement in cutting off the appropriations for modernizing the plant.

---

[23] Report of the Director of Public Works, 1896, pages 10, 12.

During the entire period of municipal operation the officers in charge were engaged in a losing fight to preserve the works from ruin. There never was a time during the entire period of responsible control when it could truly be said that the works were in an efficient condition. They were handed over to the city by the trust in a crippled state and were never put in good condition.[24]

XV—THE LEASING OF THE GAS WORKS.

The failure of the local authorities to overcome the handicap inherited from the period of trust management, combined with the unwillingness of the city council to make the appropriations necessary thoroughly to modernize the works, led to constant complaint of the service, particularly the quality of gas furnished. That these complaints were justified no one will question and the dissatisfaction which they created gradually prepared the way for the acceptance of a proposition which seemed to afford the probability of relief. The monopoly of supplying gas to a city of the size of Philadelphia was looked upon, and rightly so, as an enormously profitable undertaking. Propositions with this purpose in view were not lacking. As early as 1883 an offer of $10,000,000 was made for the plant, and although further offers were made from time to time, they did not receive serious consideration. When the offer of the United Gas Improvement Company was made in 1897 it was evident that the way had been carefully prepared for its acceptance. Both branches of councils, as well as the mayor, were determined that the lease should be consummated. They showed considerable unwillingness to have the matter thoroughly discussed. It is true that no strong public opposition developed, due largely to the fact that the people had become wearied with the inadequate gas service and looked upon the leasing proposition as a possible means of relief.

---

[24] The items given in the public reports under the head of improvements must not be confused with the requests made by the officials for the improvement of the plant. The items referred to are granted in full almost without exception by councils. Nowhere in the reports is it indicated, however, that they represent the estimates or requests for funds and authority. The phraseology generally used is "improvements for the coming year include," or "projected improvements are," and in no case is it stated that these items represent the real plans of improvement. That they do not is conclusively proven by such quotations as the following:

"The department submitted its annual estimate for the amount of appropriation required for extensions to the plant at the several works of the city and for the introduction of modern improved appliances, that the cost of manufacturing gas could be reduced to the lowest price; the estimate for the requirements of the several works and for the extension of mains was $1,080,500; the Committee on Finance reduced the amount to $250,000 and this latter amount has not yet been appropriated."

Similar quotations are found throughout Chapter XIV, above. It is to be noted further that the items in the reports do not, as a rule, mention any *amount* necessary. Therefore they are hardly to be classed as "requests for funds." In some cases also the reports mention the items as if already decided upon, and in such manner as to hardly justify calling them requests for authority. What these lists of items actually were is uncertain—perhaps they were the appropriations already passed upon by the Finance Committee. In any case they were not the plans for improvement made by the public officials.

XVI—TERMS OF THE LEASE.

Under the terms of the contract the city leased the gas works for a period of thirty years, *i. e.*, until December 31, 1927, reserving the right, however, to terminate the lease on the first of January, 1908. In order to exercise this option the contract provides that written notice of the desire of the city to terminate the lease on the first day of January, 1908, be served on the United Gas Improvement Company on or before July 1, 1907.* If the city fails to pass such ordinance on or before the above date the "option on the part of the city of Philadelphia to terminate this contract prior to December 31, 1927, shall cease and forever be at an end."

It is further provided that in case the city exercises its option, it must pay to the company all sums expended

> "In and about the alteration, enlargement, removal, extension, betterment and improvement of all said manufacturing and distributive systems and plants, with interest thereon at the rate of six (6) per cent. per annum, simple interest, together with a sum which shall be the equivalent of the appraised value of the property now belonging to the Philadelphia Gas Improvement Company[1] used as aforesaid, and interest thereon at the rate of six (6) per cent. per annum, simple interest, from the date of this lease to the date of payment."

In order to avoid controversy as to the amount to be paid by the city in case it decided to terminate the lease on January 1, 1908, it was provided:

First.—That an appraisal be made of the property of the Philadelphia Gas Improvement Company.

> "Said appraised value shall be ascertained by the report of at least a majority of three (3) appraisers, one to be appointed by the City of Philadelphia, one by the said The United Gas Improvement Company, and the third by the two first chosen. Said report of the appraisers

---

* Since this has been written the date for the serving of such notice has passed. The city has decided to allow the contract to remain in force until December 31, 1927.

[1] In 1889 the city entered into a contract with the Philadelphia Gas Improvement Association, which is controlled by the United Gas Improvement Company, for the purchase of water gas. The Philadelphia Gas Improvement Company was permitted to erect a water gas plant on city property, the city reserving the right of purchase at appraised value.

shall be filed with the Mayor of the city within sixty (60) days after the date of this contract. In order to aid in the appraisement last provided for, an inventory showing in detail the property now belonging to the Philadelphia Gas Improvement Company, used for the purpose of carrying out its contract with the City of Philadelphia, shall be made not later than thirty (30) days after the execution of this agreement. This shall be certified to as being correct by either the President or the Treasurer of The United Gas Improvement Company and the Mayor of the City of Philadelphia, representing the City. Upon the execution and delivery of this contract and of the demised premises, there shall be delivered to the Mayor the agreement of the Philadelphia Gas Improvement Company assenting to, accepting, and agreeing to be bound by the provisions of this Clause 6 relative to the property of that Company."

Secondly—That the United Gas Improvement Company file annual statements of expenditures and give to the controller of the city of Philadelphia the right to examine, audit and verify the statements.

"On the first day of February, 1898. The United Gas Improvement Company, its successors or assigns, shall file with the Controller of the City of Philadelphia a statement showing in detail expenditures during the year 1897 for alterations, enlargements, removals, betterments, and improvements not including repairs made by it in and about the Gas Works, and for the mains, meters, services, and appurtenances. On the first day of February of each year following during the continuance of this lease the said The United Gas Improvement Company, its successors and assigns, shall file with the Controller of the City of Philadelphia a similar statement of expenditures in and about the same matters made during the calendar year immediately preceding, and on the thirty-first day of December, 1907, shall file such a statement for the year ending on that date. Interest upon the amounts so shown shall be calculated and paid at the rate of six (6) per centum per annum, simple interest, from the first day of the year succeeding that in which the expenditures were made to the date of payment by the City of Philadelphia. The Controller of the City of Philadelphia shall have the right to examine, audit and verify the statements so to be filed as herein provided."

If the lease is permitted to run the full term, until December 31, 1927, the city is to receive, free of charge, the entire manufacturing and distributing plant inclusive of the property of the Philadelphia Gas Improvement Company. It is further provided that the plant shall be handed over to the city in first-class order and condition.[2]

---

[2] "Clause 7. Upon the termination of this lease by the expiration of the term specified in Clause 1 of this contract, namely on December 31, 1927, said The United Gas Improvement Company, its successors and assigns, shall deliver to the said City the property herein leased in the same good order and condition in which the same now is, to such extent as said property shall not have been altered or changed under this contract by the enlargements, extensions, betterments, and improvements made in and about the manufacturing and distributing systems and plants during the period of this lease, and together with all such alterations, changes, enlargements, extensions, betterments, and improvements, all of which shall be so delivered to the City in good first-class order and condition at such termination of the lease. Said The United Gas Improvement Company, its successors and assigns, shall also at the same time deliver to the said City in good first-class order and condition the property now belonging to the said Philadelphia Gas Improvement Company, used under said contract between it and the City of Philadelphia as above provided, and also all extensions, enlargements,

In order fully to modernize the works the company agreed to expend at least five million dollars during the first three years of the lease in the alteration, improvement, extension and betterment of the manufacturing and distributive systems, and to expend not less than fifteen million dollars for such purposes during the thirty years of the lease.

The company furthermore agrees[3] to supply gas of not less than twenty-two candle power and to pay a penalty of five hundred dollars for each day of failure to meet this standard. The contract further provides[4] that the company shall supply without charge all the gas necessary to illuminate public buildings and shall also supply gas without charge to the city's street lamps

> "and lamps in Public Squares, along the line of its mains up to the number that are being lighted at the beginning of this lease; and shall

---

improvements, and betterments of said property, free and clear of all debts and obligations of every sort, kind, and description; and together with the right to use all processes of every kind useful in the manufacture of gas then established and in use at any of said works. All the changes, alterations, constructions, removals, and repairs which shall be necessary to be made from time to time in the proper maintenance, extension, improvement, and betterment of the said leased Gas Works and appurtenances and the plant of the Philadelphia Gas Improvement Company, shall be made and done by said The United Gas Improvement Company, its successors and assigns, and the City of Philadelphia shall receive the same, together with the said plants and all the property of the Philadelphia Gas Improvement Company, in an efficient state at such expiration of this lease without any charge or cost to the City of Philadelphia. It is the intent of this agreement that the City of Philadelphia at the end of the term, namely on December 31, 1927, shall, without charge or cost, receive all of the said works in the condition of alteration, improvement, and change in which the same shall then exist, and the same shall be so maintained as to be then in first-class order and condition. Said The United Gas Improvement Company shall at its own cost and expense keep the buildings, machinery, and other property of the City of Philadelphia delivered to it, and which shall be constructed by it under this lease of the character usually insured by gas companies insured to the extent that such properties of gas companies are usually insured (but not less than the total insurance now carried by the City on said property), and shall insure the buildings, machinery, and other property of the City of Philadelphia delivered to it under this lease to an amount not less than the total insurance of the same now carried by the said City, and shall expend all sums received by it under any such policies of insurance upon the repair, replacement, or reconstruction of the city's buildings, machinery, and other property so damaged or destroyed by fire, received by said lessee hereunder. Upon the termination of this contract, either on December 31, 1907, or on December 31, 1927, the City of Philadelphia shall have the option to purchase all the coal, oil, coke, tar, lime, and other gas-making supplies and residual products then on hand at said works at the then market price, or to have the said The United Gas Improvement Company, its successors and assigns, remove the same at its own cost and expense as soon as conveniently can be done. All the gas in the holders, mains, and pipes of said works at the termination of this contract, either on December 31, 1907, or on December 31, 1927, shall be accounted for at holder cost by the City to The United Gas Improvement Company when paid for by consumers."

[3] Clause 9, Lease of Philadelphia Gas Works to The United Gas Improvement Company

[4] Clause 10.

also in each succeeding year supply gas without charge to three hundred (300) street lamps or lamps in Public Squares in each year along the line of its mains in addition to the number supplied in the preceding year when directed so to do by ordinance of Councils, which shall also specify the location of the same. All said lamps shall be furnished with burners which shall give not less than 22 candle-power, and shall be lighted every night and all night. Said The United Gas Improvement Company, its successors and assigns, shall at its own cost and expense run all services and make all connections between said street lamps and its distributing pipes or mains, furnish all burners required on said street lamps, and light, clean, extinguish, and repair all lamps and lanterns, and keep in repair all lamp-posts, lamps, and lanterns in use during the term of this lease."

The provisions governing the cost of gas to the consumer are in some respects peculiar. A standard rate of one dollar per thousand cubic feet is fixed in clause 11, but councils is given power to reduce the price within the following limits:

1. Until and including the thirty-first day of December, 1907, ninety (90) cents per thousand cubic feet.
2. From January first, 1908, until and including December 31, 1912, eighty-five (85) cents per thousand cubic feet.
3. From January first, 1913, until and including December 31, 1917, eighty (80) cents.
4. From January first, 1918, until and including December 31, 1927, seventy-five (75) cents.

If councils avails itself of this right the company is to make no payments into the city treasury. If, however, the price of gas is not reduced to the minimum figures above mentioned the city treasury is to receive from the company the difference between the price paid by the consumer and the minimum amounts above specified. In other words, the company is required to pay to the city

"Upon all gas sold prior to January 1, 1908, all sums received by them in excess of ninety (90) cents per thousand cubic feet. Upon all gas sold after December 31, 1907, and prior to January 1, 1913, all sums so received in excess of eighty-five (85) cents per thousand cubic feet. Upon all gas sold after December 31, 1912, and prior to January 1, 1918, all sums so received in excess of eighty (80) cents per thousand cubic feet. Upon all gas sold after December 31,1917, and prior to January 1, 1928, all sums so received in excess of seventy-five (75) cents per thousand cubic feet."

The company is furthermore required to pay into the city treasury ten thousand dollars ($10,000) annually towards paying the salaries and expenses of the city inspector of meters and his assistants and the expenses incident to the gas tests.

At the time the lease was signed every effort was made both by the mayor and members of councils to convince the people that the terms were most advantageous to the city. The warning of the few opposition members of councils, that the lease failed to conform to some of the fundamental principles that should govern the relation between the municipality and the public-service corporations, remained unheeded. The accumulated experience of the ten years that have elapsed since the signing of the lease has strengthened the force of the objections then raised. As regards the right to terminate the contract in 1908, the terms of the contract place the city completely at the mercy of the company. As has already been pointed out, the contract provided for no adequate control of the accounts of the company for the purpose of ascertaining whether the reported statements for improvements, betterments, enlargements, alterations and removals were correctly classified. No matter how scrupulously honest the company may be, the city should have independent means of determining whether the amounts which it will be expected to return to the company in case it shall exercise the option to terminate the lease on the first of January, 1908, have been actually expended for the purposes mentioned.

As will appear in the accompanying table, the controller's books show that from the beginning of the lease in 1897 until the close of the fiscal year 1905, the company expended $11,354,919.77 for improvements, betterments, enlargements, alterations and removals.

Even if the city should desire to exercise its option it is extremely doubtful whether it can do so. In 1905 the city was within $14,338,567 of the constitutional debt limit. More than half of this is practically pledged for the completion of the filtration plant, the abolition of grade crossings and other important local improvements. Should the city exercise its option to terminate the lease in 1908 it will have to pay to the company not less than fifteen million dollars, and probably considerably more. Even allowing for the increase on property valuation between 1905 and 1908, the amount required will probably be considerably beyond its constitutional borrowing powers.

STATEMENT

Showing the Expenditures for Improvements, Betterments, Enlargements, Alterations and Removals; Also Sundry Credits for the Years 1897 to 1905 Inclusive, by the United Gas Improvement Company, Lessees Philadelphia Gas Works.

Year.	*Improvements.*	*Betterments.*	*Enlargements.*	*Alterations.*	*Removals.*	*Total.*
1897	$22,103 15	$8,552 01	....	....	$677 96	$31,333 12
1898	2,266,073 07	632,854 53	$202,529 19	$5,849 55	7,225 91	3,114,532 25
1899	1,413,269 81	1,006,005 34	61,472 95	1,001 61	622 12	2,482,371 83
1900	781,671 56	370,273 70	13,533 52	....	12,060 99	1,177,539 77
1901	440,997 99	169,176 50	3,360 13	....	1,153 83	614,688 45
1902	781,289 05	188,245 12	....	....	....	969,534 17
1903	946,519 83	289,324 52	....	....	....	1,235,844 35
1904	884,475 04	116,350 38	....	....	....	1,000,825 42
1905	655,758 36	90,136 49	....	....	....	745,894 85
	$8,192,157 86	$2,870,918 59	$280,895 79	$6,851 16	$21,740 81	$11,372,564 21
Credits						17,644 44
Balance						$11,354,919 77

Sundry Credits.

1898	Sundry accounts	$1,703 18
1899	Removals	8,723 55
1900	Removals	6,515 71
1901	Removals	695 35
	Enlargements	6 65
		$17,644 44

The most serious omission is the failure to insert any adequate provision for the participation of the city and its inhabitants in the benefits accruing from reductions in the cost of production of gas. It is true that councils may reduce the price of gas within certain specified limits, but this reduction, if made, simply diverts money into the pocket of the consumer which would otherwise flow into the city treasury. The unfortunate choice is put to councils to perpetuate an inordinately high price of gas or to sacrifice an important source of public revenue. The importance of this item is shown in the accompanying table.

Payments Made by the United Gas Improvement Company to the City of Philadelphia Since 1897.

1898	$268,459.16
1899	351,469.04
1900	385,130.55
1901	429,813.75
1902	519,965.59
1903	645,685.03
1904	652,942.65
1905	679,932.84
Total	$3,933,398.61

The best interests of the city require that councils should make the fullest use of its power to reduce the price of gas to the consumer. Under the plan as incorporated in the contract the local legislative authority is extremely reluctant to reduce the price of gas to the consumer, as such a course makes it necessary to supply the revenue thus sacrificed through an increase in the tax rate. During the first ten years of the lease councils might have reduced the price of gas to ninety cents per thousand cubic feet, but would thereby have deprived the city treasury of the ten cents per thousand cubic feet sold[5] as specified in the contract. The failure to make the reduction assured the city a considerable revenue, but, on the other hand, the payment by the consumer of the additional ten cents per thousand cubic feet constitutes a tax which falls heaviest on those least able to pay. The broader social interests of the community demand that the use of gas both for lighting and cooking purposes shall be as widely encouraged as possible, and anything which tends to maintain a high price is to that extent an obstacle to social progress. It is true that neither the action nor inaction of councils in any way affects the profits of the company, but the system itself is an unfortunate one from the point of view of the social welfare of the community.

Another omission to which attention should be called is that no provision is made for any form of control over the accounting of the company. The city authorities and the general public are without any means of ascertaining the relation of the price charged to the cost of production. Even the provision which gives the controller the right to audit the company's expenditures for alterations, enlargements, removals, betterments and improvements is of little value, as the classification of expenditures is left to the discretion of the company. The controller's audit does not go back of the company's classification.

---

[5] Amounting in 1905 to $679,932.84.

The contract with the company was drawn up without any reference to the great future possibilities in the reduction of the cost of producing gas. The local authorities seem to have lost sight of the fact that up to three years before the lease was consummated, the gas plant had been paying substantial profits to the city, profits which might have been greatly increased or the price of gas greatly lessened had adequate manufacturing and distributing facilities been installed. What changes in the methods of production will be made during the next twenty years no one can say, but it is evident that any long term lease should at least provide a means by which the city and its inhabitants may participate in the benefits of such improvements.

XVII—THE GAS SERVICE UNDER THE LEASE.

Availing itself of the power granted in the contract the United Gas Improvement Company assigned the lease to a subsidiary company known as the Equitable Illuminating Company. This was done in order to keep the Philadelphia accounts distinct from the large number of gas plants in other cities owned and operated by the United Gas Improvement Company. The Northern Liberties Gas Company, a private corporation, which supplied a small section of the city, is also operated by the United Gas Improvement Company under an agreement of July 2, 1900. The plant of this company is not a part of the Philadelphia Gas Works, and its rights were specifically protected by the terms of the lease.[1]

The gas service since the beginning of the lease has been such as fully to satisfy the demands of the public. It is generally agreed that the officials of the United Gas Improvement Company have done everything in their power to improve the service in every respect. Complaints are given prompt attention and differences adjusted in a spirit of fairness. In encouraging the use of gas for cooking purposes the company has performed a real service.

It is not likely that there would have been the slightest agitation for the termination of the lease in 1908 had it not been for the unfortunate proposition submitted by the company in May, 1905, for the further extension of the lease until the thirty-first of December, 1977. It is not within the province of this monograph to discuss the details of the proposal nor the influences back of it. To what extent the hands of the company were forced by unscrupulous politicians will probably never be disclosed. Suffice it to say that the proposition passed both branches of councils and though vetoed by the mayor would have been passed over his veto had there not been an upheaval of popular indignation which brought the city to the verge of riot and disorder.

---

[1] Clause 1. "That to such extent as the Northern Liberties Gas Company is now possessed of the right to supply gas within any portion of the City of Philadelphia, this contract shall not be construed as intended to vest in the lessee any right in such territory, except such rights as the City has therein."

This incident has had a curious effect on the public opinion of the community. It has developed a distrust of the influence of public service corporations on the civic life of the community. Whereas prior to the recent agitation the people pointed with a certain local pride to the United Gas Improvement Company, there is now prevalent a keen sensitiveness to the dangerous political influence which such a corporation can exercise. Whether justified or not, the existence of this feeling is likely to have no inconsiderable influence on the future relation of the city of Philadelphia to the gas supply.

APPENDIX.

ORDINANCE OF THE CITY OF PHILADELPHIA AUTHORIZING THE LEASING OF THE GAS WORKS AND AGREEMENT BETWEEN THE CITY AND THE UNITED GAS IMPROVEMENT COMPANY.

AN ORDINANCE.

Authorizing the Execution of a Contract with The United Gas Improvement Company, its successors and assigns, by the City of Philadelphia, for the lease to the former of the gas works, street mains, conduits, pipes, services, meters, and other property, real and personal, of the latter, used for and in connection with the manufacture and distribution of gas in the City of Philadelphia; for the operation, maintenance, enlargement, extension, and betterment of the same; for the manufacture and distribution of gas in said city by said The United Gas Improvement Company, its successors and assigns, and for the exclusive supply, by said lessee and its assigns, of all gas to be supplied to consumers by or with the consent of said city during the term of the lease; and also consenting to the entry of The Equitable Illuminating Gas Light Company of Philadelphia upon the streets of the City of Philadelphia, in case of its becoming an assignee of The United Gas Improvement Company to such extent as shall be necessary to enable it to perform its duties as such assignee.

WHEREAS, The sole source of supply of gas in the City of Philadelphia, saving of that manufactured and supplied to said city under its contract dated the third day of August, 1888, with the Philadelphia Gas Improvement Company, and also of that supplied by the Northern Liberties Gas Light Company, which latter Company claims a right also to supply gas in portions of said city, is certain property known collectively as the Philadelphia Gas Works, owned by said city and now operated by it; and,

WHEREAS, Very large sums of money ought now to be expended in laying additional mains, services, and connections in supplying meters and appurtenances, and in the erection of new and additional apparatus necessary for the economical manufacture, storage, and distribution of gas sufficient to supply the present and prospective demands for gas by the city and its inhabitants; and,

WHEREAS, The requirements of the city for other municipal purposes are of such a pressing character that it would be extremely inconvenient for it to make said expenditures at the present; and,

WHEREAS, It is deemed desirable to secure by contract with a responsible company the maintenance, operation, development, and extension of its gas plant, and of its system of distribution of gas, for a term of years, and also to resume at the end of said term possession of its works and plant, modernized and fully equipped, without impairment of the exclusive privilege of supplying gas within the limits of said city now vested in it; and,

Whereas, Said object can be accomplished by leasing all its property, real and personal, known collectively as the Philadelphia Gas Works, and the appurtenances, for a comparatively long term of years, under a contract insuring to the lessee during said term possession of said works and of the exclusive right, except as hereinafter noted, to supply the citizens of Philadelphia with gas; now, therefore,

Section 1. *The Select and Common Councils of the City of Philadelphia do ordain:*—

That the Mayor of said city be, and hereby is authorized to execute and deliver on the part of the city to The United Gas Improvement Company, a corporation of the State of Pennsylvania, its successors and assigns, a lease and contract in the words following, and that the same, when delivered, shall be binding upon the City of Philadelphia:—

This agreement, made this day of , 189 , between the *City of Philadelphia* of the one part, and *The United Gas Improvement Company*, a corporation duly organized under the laws of the State of Pennsylvania, having its principal office in said city of Philadelphia, of the second part, *witnesseth:*

Whereas, By an ordinance of the City of Philadelphia entitled "An Ordinance Authorizing the Execution of a Contract with The United Gas Improvement Company, its successors and assigns, by the City of Philadelphia, for the lease to the former of the gas works, street mains, conduits, pipes, services, meters, and other property, real and personal, of the latter, used for and in connection with the manufacture and distribution of gas in the City of Philadelphia; for the operation, maintenance, enlargement, extension, and betterment of the same; for the manufacture and distribution of gas in said city by said The United Gas Improvement Company, its successors and assigns, and for the exclusive supply, by said lessee and its assigns, of all gas to be supplied to consumers, by or with the consent of said city during the term of the lease; and also consenting to the entry of The Equitable Illuminating Gas Light Company of Philadelphia upon the streets of the City of Philadelphia, in case of its becoming an assignee of The United Gas Improvement Company to such extent as shall be necessary to enable it to perform its duties as such assignee," duly approved the day of , 189 , it was provided for the reasons therein set forth that this contract should be executed; now,

Therefore, It is agreed between the parties hereto as follows:

AGREEMENT.

This agreement, Made this twelfth day of November, 1897, between the City of Philadelphia, of the one part, and The United Gas Improvement Company, a corporation duly organized under the laws of the State of Pennsylvania, having its principal office in said City of Philadelphia, of the second part, witnesseth:—

Whereas, By an ordinance of the City of Philadelphia entitled "An Ordinance authorizing the execution of a contract with The United Gas Improvement Company, its successors and assigns, by the City of Philadelphia, for the lease to the former of the gas works, street mains, conduits, pipes, services, meters and other property, real and personal, of the latter, used for and in connection with the manufacture and distribution of gas in the City of Philadelphia; for the operation, maintenance, enlargement, extension and betterment of the same; for the manufacture and distribution of gas in said city by said The United Gas Improvement Company, its successors and assigns, and for the exclusive supply, by said lessee and its assigns, of all gas to be supplied to consumers by or with the consent of said city during the term of the lease; and also consenting to the entry of The Equitable Illuminating Gas Light Company of Philadelphia upon the streets of the City of Philadelphia, in case of its becoming an assignee of The United Gas Improvement Company, to such extent as shall be necessary to enable it to perform its duties as such assignee," duly approved the twelfth day of November, 1897, it was provided for the reasons therein set forth that this contract should be executed;

Now, Therefore, It is agreed between the parties hereto as follows:—

CLAUSE 1. The City of Philadelphia does hereby lease to the said The United Gas Improvement Company, its successors and assigns, for the term beginning the twelfth day of November, 1897, and ending December 31, 1927, all the property, real and personal, collectively known as the Philadelphia Gas Works, with the appurtenances, including, *inter alia*, the property particularly described in Exhibit A, hereto attached, which is to be taken as a part of this contract, comprising, generally, the land, buildings, tenements, machinery, apparatus, tools, mains, pipes, services, meters and other appurtenances possessed or used by or for the City of Philadelphia in the manufacture, storage, sale, distribution and supply of gas, it being understood that the specification of said leased property in said Exhibit A shall not be construed in such way as to exclude from the list any items omitted which should have been therein included; and that no unpaid bills for gas or liens against real estate for the same nor unpaid accounts for residual products existing at the date when the lessee takes possession are included or intended to be included in the property herein assigned and leased; and it being further understood and agreed that The United Gas Improvement Company, its successors and assigns, shall at its own expense assume and pay any and all ground-rents and the rental of any land, building or buildings of which the city is a lessee which are used in connection with the city's gas business. Delivery shall be made of all such property to said The United Gas Improvement Company, its successors and assigns, by the City of Philadelphia, as soon as may be after the execution of these presents and antecedently to the date fixed for the commencement of the lease, and upon the performance by the said The United Gas Improvement Company of the obligations imposed upon it by Clause 3 of this agreement, it being understood that the City of Philadelphia also must do all necessary on its part to be done to enable said The United Gas Improvement Company to know the amount to be paid under Clause 2. And said lessee hereby agrees that it will pay all rents or other charges for water which shall be used by the lessee upon the leased premises or any part thereof.

The City of Philadelphia does hereby authorize and empower the said The United Gas Improvement Company, its successors and assigns, hereafter during the term of this contract to retain possession of, maintain, change, alter and repair, and to operate said gas works and appurtenances and all the property hereby leased, and to lay, repair, remove, relay, extend, and maintain mains, pipes, services and appurtenances along and beneath the surface of the highways, streets, avenues, alleys, ways and public places in said city for the supply and distribution of gas; and said company, its successors and assigns, during the continuance of this contract, shall have the exclusive right, for said purposes, to enter upon and occupy all said highways, streets, avenues, lanes, ways, alleys and public places, and to supply and distribute gas through pipes laid therein: *Provided, however*, That to such extent as the Northern Liberties Gas Light Company is now possessed of a right to supply gas within any portion of the City of Philadelphia, this contract shall not be construed as intended to vest in the lessee any right in such territory, except such rights as the city has therein. The City of Philadelphia agrees that during the term of this contract it will do nothing, by ordinance or otherwise, which will in any way interfere with, or limit, restrict or impair this exclusive right hereby vested in said The United Gas Improvement Company, its successors and assigns.

All openings, excavations and repaving shall be made subject to such general rules and regulations as from time to time shall be in force concerning the opening, excavation and repaving of streets and the protection of travel along same, and the trenches shall be refilled and repaved with the same material and character of paving as before they were opened. All openings, excavations, repaving and refilling shall be subject to the approval of the Department of Public Works. If at any time The United Gas Improvement Company, its successors or assigns, shall neglect or refuse to refill any trenches and repave over all openings which it or its successors or assigns shall have made upon notifications from the Department of Public Works, said department is hereby given full power and authority to do such refilling and repaving at the expense and cost of The United Gas Improvement Company, its successors and assigns, and if the City of Philadelphia at any time in the future build and construct a suitable sub-way that the said lessee, its successors and assigns, shall and will when so requested by the City of Philadelphia place its pipes in such sub-way at its own cost and expense, and no rental shall be charged therefor by the City of Philadelphia.

It shall be lawful for the said The United Gas Improvement Company to assign this contract to The Equitable Illuminating Gas Light Company of Philadelphia, and to any other corporation of Pennsylvania having power to exercise the franchise, and also to enter into an agreement with said company, or with any other of said companies, for the performance, in whole or in part, of this contract, or for vesting in such assignee any rights under this contract, and to authorize such other company or companies to do all things necessary in and about such performance, including the occupancy and use of the highways, streets, avenues, lanes, ways, alleys and public places in laying, repairing, removing, relaying, extending and maintaining mains, pipes, services, and appurtenances and supplying gas. Authority is hereby given to the said The Equitable Illuminating Gas Light Company of Philadelphia, assignee as aforesaid, and to any other corporation which may thus become the assignee or covenantee of the said The United Gas Improvement Company, to enter upon and to occupy the highways, streets, avenues, lanes, ways, alleys and public places of the City of Philadelphia during the existence of this lease, but no longer, for the purpose of laying, repairing, removing, relaying, extending and maintaining mains, pipes, services, and all other appurtenances and appliances necessary for the distribution of gas to the City of Philadelphia and to the inhabitants thereof. Such assignees, including the said The Equitable Illuminating Gas Light Company of Philadelphia, may manufacture, distribute and sell gas in all parts of the City of Philadelphia subject to the same limitations and restrictions as are herein imposed in the grant to The United Gas Improvement Company, to said city and to the inhabitants thereof at all times hereafter during the existence of this lease.

No assignment of this lease, or of any of the rights or privileges herein granted, nor any contract with the said The Equitable Illuminating Gas Light Company of Philadelphia, or any other company, shall in any way diminish the primary obligation and liability of the said The United Gas Improvement Company to perform all the obligations of this contract. Its obligation hereunder shall in no respect be diminished or impaired by any such assignment or contract, but it shall remain liable jointly with such assignee or covenantee for the performance of all the obligations hereof to the same extent as if no assignment, sub-lease or contract had been made by it. In any case in which an assignment or assignments of this contract shall be made, written notice that an assignment has been made, giving the name of the assignee and the date of the assignment, shall be filed by The United Gas

Improvement Company, in the office of the Mayor, before the assignee shall acquire any rights under this contract.

CLAUSE 2.—An inventory and appraisement shall be prepared by the Director of Public Works of all coal, coke, tar and lime on hand at said city's Gas Works and of all gas on hand in the holders, mains and pipes of the city when the property leased shall be delivered to the lessee hereunder, and said The United Gas Improvement Company shall pay to said city the amount of this appraisement at once upon presentation to it of such inventory and appraisement. In making such appraisement the Director shall be guided by the cost (in case of gas in holder, mains and pipes, it shall be city's holder cost) of the articles named therein. The appraisement of this inventory shall be made by the Director of the Department of Public Works, or by an appraiser or appraisers appointed by him; said appraisers shall be guided by and bound by the market price of the articles which will be enumerated in the said inventory at the date this ordinance beomes a law. The current bills for gas shall be collected by The United Gas Improvement Company, which shall pay to the City Treasurer, as received, the proportion of said receipts to which it is herewith agreed said city shall be entitled, which proportion shall be represented in each case by a fraction having as its denominator the number of days covered by the bill and for its numerator the number of said days during which gas was supplied to said consumer by the city.

CLAUSE 3.—Simultaneously with the execution of this agreement, The United Gas Improvement Company shall execute and deliver to the City of Philadelphia its bond, with surety or sureties, in the penal sum of one million (1,000,000) dollars, conditioned for the faithful performance of the obligations hereof. Such bond shall be in such form as shall be approved by the City Solicitor, and the surety or sureties thereon shall be approved by him.

CLAUSE 4.—The said The United Gas Improvement Company, its successors and assigns, shall, at the expiration of two years from the date of the lease, surrender, release and deliver to the City of Philadelphia full and absolute possession of all that part or portion of the property known as the Ninth Ward Station, described as follows, to wit: All that certain lot or piece of ground with the buildings thereon erected, bounded on the south by Chestnut Street, on the east by Twenty-fourth Street, on the north by Market Street, and on the west by the Schuylkill River; and also, all that certain lot or piece of ground with buildings thereon erected, bounded on the south by Market Street, on the west by the Schuylkill River, on the north by the Pennsylvania Railroad, and on the east by Twenty third Street: *Provided, however*, That the said The United Gas Improvement Company, its successors and assigns, shall have the right to remove the works, machinery and appliances located upon the property so to be delivered, surrendered and released, to other portions of the leased property at any time prior to the surrender of said two above-described lots or pieces of ground and buildings thereon erected.

CLAUSE 5.—The City of Philadelphia hereby assigns to the said The United Gas Improvement Company, its successors and assigns, all its rights under its contract with the Philadelphia Gas Improvement Company dated the third day of August, 1888, and it agrees that said Philadelphia Gas Improvement Company may assign the same contract to the said The United Gas Improvement Company, its successors and assigns.

CLAUSE 6.—If, on or before the first day of July, 1907 (and time in this respect shall be of the essence of this contract), there shall have been served upon The United Gas Improvement Company a written notice, signed by the Mayor of the City of Philadelphia, of the desire of said city to terminate this contract at the expiration of ten (10) years from the first day of January, 1898, and if, on or before said first day of July, 1907, an ordinance providing for such termination shall have been duly enacted by said City of Philadelphia, then it shall be the right of said City of Philadelphia to terminate this contract at the expiration of ten (10) years from the first day of January, 1898: *Provided*, That on or before December 31st, 1907 (and time in this particular shall be of the essence of this contract), the payments herein provided to be made to the said The United Gas Improvement Company, its successors and assigns, shall have been fully and completely made by said city. In case of a failure to pass said ordinance on or before said first day of July, 1907, or of a failure to notify The United Gas Improvement Company on or before that date of the desire of the city to take possession of the leased property in pursuance of said ordinance, or of the failure of the City of Philadelphia to pay in full, on or before the thirty-first day of December, 1907, the amount of money herein provided, this option on the part of the City of Philadelphia to terminate this contract prior to December 31st, 1927, shall cease and be forever at an end.

The payment which must be so made to The United Gas Improvement Company, its successors and assigns, shall be a reimbursement of all sums of money expended by the said The United Gas Improvement Company, its successors or assigns, subsequent to the date of this contract, in or about the buildings, apparatus, machinery, mains, pipes, services, connections, meters, appliances and appurtenances of the Philadelphia Gas Works and of the gas works now owned and operated by said Philadelphia Gas Improvement Company, including, however, such sum or sums of money only by the said company, its successors and assigns, paid in and about the alteration, enlargement, removal, extension, betterment and improvement of all said manufacturing and distributive systems and plants, with interest thereon at the rate of six (6) per centum per annum, simple interest; together with a sum which shall be the equivalent of the appraised value of the property now belonging to the Philadelphia Gas Improvement Company used as aforesaid, and interest thereon at the rate of six (6) per cent. per annum, simple interest, from the date of this lease to the date of payment. Said appraised value shall be ascertained by the report of at least a majority of three (3) appraisers, one to be appointed by the City of Philadelphia, one by the said The United Gas Improvement Company, and the third by the two first chosen. Said report of the appraisers shall be filed with the Mayor of the city within sixty (60) days after the date of this contract.

In order to aid in the appraisement last provided for, an inventory showing in detail the property now belonging to the Philadelphia Gas Improvement Company, used for the purpose of carrying out its contract with the City of Philadelphia, shall be made not later than thirty (30) days after the execution of this agreement. This shall be certified to as being correct by either the President or the Treasurer of The United Gas Improvement Company and the Mayor of the City of Philadelphia representing the city.

Upon the execution and delivery of this contract and of the demised premises, there shall be delivered to the Mayor the agreement of the Philadelphia Gas Improvement Company assenting to, accepting and agreeing to be bound by the provisions of this Clause 6 relative to the property of that company.

On the first day of February, 1898, The United Gas Improvement Company, its successors or assigns, shall file with the Controller of the City of Philadelphia a statement, showing in detail expenditures during the year 1897, for alterations, enlargements, removals, betterments and improvements, not including repairs made by it in and about the gas works, and for the mains, meters, services and appurtenances. On the first day of February of each year following, during the continuance of this lease, the said The United Gas Improvement Company, its successors and assigns, shall file with the Controller of the City of Philadelphia a similar statement of expenditures in and about the same matters made during the calendar year immediately preceding and on the thirty-first day of December, 1907, shall file such a statement for the year ending on that date. Interest upon the amounts so shown shall be calculated and paid at the rate of six (6) per centum per annum, simple interest, from the first day of the year succeeding that in which the expenditures were made to the date of payment by the City of Philadelphia. The Controller of the City of Philadelphia shall have the right to examine, audit and verify the statements so to be filed as herein provided.

Said The United Gas Improvement Company hereby agrees that upon the receipt of payments aforesaid it shall and will execute and deliver to the City of Philadelphia good and sufficient deeds and instruments in writing necessary to transfer and convey said property so paid for to said City of Philadelphia.

Said option shall only be exercised in the way and manner and upon the terms herein provided. If it shall so happen that the said city cannot exercise or shall not exercise this option upon the terms herein provided this contract shall be treated as though said option had never been given.

Clause 7.—Upon the termination of this lease by the expiration of the term specified in Clause 1 of this contract, namely, on December 31, 1927, said The United Gas Improvement Company, its successors and assigns, shall deliver to the said city the property herein leased in the same good order and condition in which the same now is, to such extent as said property shall not have been altered or changed under this contract by the enlargements, extensions, betterments and improvements made in and about the manufacturing and distributing systems and plants during the period of this lease, and together with all such alterations, changes, enlargements, extensions, betterments and improvements, all of which shall be so delivered to the city in good first-class order and condition at such termination of the lease. Said The United Gas Improvement Company, its successors and assigns, shall also at the same time deliver to the said city in good first-class order and condition the property now belonging to the said Philadelphia Gas Improvement Company, used under said contract between it and the City of Philadelphia, as above provided, and also all extensions, enlargements, improvements and betterments of said property, free and clear of all debts and obligations of every sort, kind and description; and together with the right to use all processes of every kind useful in the manufacture of gas then established and in use at any of said works. All the changes, alterations, constructions, removals and repairs which shall be necessary to be made from time to time in the proper maintenance, extension, improvement and betterment of the said leased Gas Works and appurtenances and the plant of the Philadelphia Gas Improvement Company, shall be made and done by said The United Gas Improvement Company, its successors and assigns, and the City of Philadelphia shall receive the same, together with the said plants and all the property of the Philadelphia Gas Improvement Company, in an efficient state at such expiration of this lease without any charge or cost to the City of Philadelphia. It is the intent of this agreement that the City of Philadelphia at the end of the term, namely, on December 31, 1927, shall without charge or cost receive all of the said Works in the condition of alteration, improvement and change in which the same shall then exist, and the same shall be so maintained as to be then in first-class order and condition.

Said The United Gas Improvement Company shall at its own cost and expense keep the buildings, machinery and other property of the City of Philadelphia delivered to it, and which shall be constructed by it under this lease, of the character usually insured by gas companies insured to the extent that such properties of gas companies are usually insured (but not less than the total insurance now carried by the city on said property), and shall insure the buildings, machinery and other property of the City of Philadelphia delivered to it under this lease to an amount not less than the total insurance of the same now carried by the said city, and shall expend all sums received by it under any such policies of insurance upon the repair, replacement or reconstruction of the city's buildings, machinery and other property so damaged or destroyed by fire, received by said lessee hereunder.

Upon the termination of this contract, either on December 31st, 1907, or on December 31st, 1927, the City of Philadelphia shall have the option to purchase all the coal, oil, coke, tar, lime and other gas-making supplies and residual products then on hand at said works at the then market price, or to have the said The United Gas Improvement Company, its successors and assigns, remove the same at its own cost and expense as soon as conveniently can be done. All the gas in the holders, mains and pipes of said works at the termination of this contract, either on December 31st, 1907, or on December 31st, 1927, shall be accounted for at holder cost by the city to The United Gas Improvement Company when paid for by consumers.

Clause 8.—The United Gas Improvement Company agrees for itself, its successors and assigns, that it shall and will, within three (3) years from the date of the delivery to it of the said Gas Works, expend in the alteration, improvement, extension and betterment of the manufacturing and distributive system, and mains, services, meters, connections and appurtenances of said Gas Works referred to in this ordinance, at least five million (5,000,000) dollars, and thereafter in each year during the continuance of this contract expend such sums of money as may be needed from time to time to extend the same to provide for the growth of the business so as to supply gas wherever it may be demanded, in accordance with the terms, provisions and conditions of this clause of the lease. It is estimated that the total of such expenditures will be at least fifteen million (15,000,000) dollars, and the said The United Gas Improvement Company hereby agrees and binds itself, its successors and assigns, that it shall and will expend said sum of fifteen million (15,000,000) dollars during said period of thirty (30) years, and that it shall and will also expend all such other amounts over the above fifteen million (15,000,000) dollars which may be required for the purposes stated above. The said The United Gas Improvement Company, its successors and assigns, shall extend the pipes and mains for the distribution of gas on such highways, streets, avenues, alleys, ways and public places as may be necessary to meet the demand for gas, provided that at least one (1) consumer for every one hundred (100) feet of the extension of mains or pipe so made necessary shall first in writing agree to take gas from the said The United Gas Improvement Company, its successors and assigns, for a period of not less than one (1) year at the general rates for gas then in force; or in lieu of a consumer so contracting for each and every single building fitted with gas pipes, and for which application for the introduction of gas shall be made, such extension of one hundred (100) feet of mains or pipes so made necessary shall be made accordingly: *Provided further, however*, In no case shall said company, its successors and assigns, be required to lay any pipes while frost is in the ground. The laying or extension of pipes and mains for the distribution of gas shall be at the expense of the lessee and not chargeable to the consumer.

Said The United Gas Improvement Company, its successors and assigns, shall at its own expense lay and furnish connecting or service pipes from the main or distributing pipes to the inside of the consumer's property line, and furnish and set the necessary meters (for which no charge or rental shall be made), and shall also at its own expense furnish and place a shut-off or stop cock inside of the curb line whenever it desires to place the same.

The intention of this agreement is that all changes, extensions, improvements, removals and alterations in said Gas Works, in the mains, pipes and appurtenances thereto, and in the property needed to meet the demands for gas as herein provided, shall be made in such way and manner as shall maintain said Gas Works in first class condition, with the best and most economical processes in use that are customary in the best regulated gas works. It is the further intent of this agreement that, without cost to the City of Philadelphia, all such extensions, improvements, alterations and betterments in the manufacturing or distributing system of said Gas Works shall, upon the termination of the lease by the expiration of its full term, viz.: on December 31st, 1927, pass to and vest in the City of Philadelphia upon the terms and conditions herein provided.

CLAUSE 9.—Said United Gas Improvement Company, or its assigns, shall furnish proper stations for testing the candle power of the gas, located at a distance of not less than one (1) mile from each point of manufacture, and shall equip the same with a bar photometer and other appliances customary and necessary for such purposes. Tests shall be made and recorded daily by The United Gas Improvement Company or its assigns, and such records shall be at all times open to the inspection of the city. All such tests shall be made in the presence of a representative of the city appointed by the Mayor, who shall have the right to also make such tests himself at such stations in the presence of the company's representative. Such representative of the city shall be the Inspector of Meters, if City Councils shall provide by this contract or otherwise for the appointment of such an official.

The said The United Gas Improvement Company, its successors or assigns, shall, as soon after the delivery to them of said Gas Works hereunder as is possible with due diligence and dispatch, supply gas of good quality of not less than twenty-two (22) candle-power, daily average tested as above, and maintain said supply during the continuance of this lease unless prevented by accidents beyond their control.

After the expiration of two years from the date of this lease for every failure of The United Gas Improvement Company, its successors or assigns, to comply with the terms and conditions of this clause relative to tests, quality and candle-power of gas, the said The United Gas Improvement Company, its successors and assigns, shall pay to the City of Philadelphia a penalty of five hundred (500) dollars for each day during which such failure continues. In every case of such default and demand made by the city for the payment of the fine The United Gas Improvement Company, its successors or assigns, shall make payment of the fine to the city, but said The United Gas Improvement Company, its successors or assigns, shall be entitled to repayment of the same by the city if it shall be shown that the default on account of which the fine was imposed was due to causes beyond the control of said The United Gas Improvement Company, its successors and assigns.

CLAUSE 10.—The United Gas Improvement Company, its successors and assigns, shall from time to time, as the same shall be demanded by the City of Philadelphia, supply to it in each year without charge, delivered in its various public buildings, along the line of its mains, such amounts of gas as may be required for illuminating purposes in said public buildings; said The United Gas Improvement Company, its successors and assigns, shall also supply gas without charge to the city's street lamps and lamps in public squares, along the line of its mains up to the number that are being lighted at the beginning of this lease; and shall also in each succeeding year supply gas without charge to three hundred (300) street lamps or lamps in public squares in each year along the line of its mains in addition to the number supplied in the preceding year when directed so to do by ordinance of Councils, which shall also specify the location of the same. All said lamps shall be furnished with burners which shall give not less than 22 candle power and shall be lighted every night and all night.

Said The United Gas Improvement Company, its successors and assigns, shall, at its own cost and expense, run all services and make all connections between said street lamps and its distributing pipes or mains, furnish all burners required on said street lamps, and light, clean, extinguish and repair all lamps and lanterns and keep in repair all lamp-posts, lamps and lanterns in use during the term of this lease.

CLAUSE 11.—The price which shall be charged to all consumers, other than the City of Philadelphia, by the said The United Gas Improvement Company, its successors and assigns, shall, until otherwise provided by ordinances of Councils, be one (1) dollar per thousand cubic feet. It shall be competent for Councils to reduce these charges from time to time by ordinances; but said ordinances shall not at any time reduce the price below the following:—

Until and including the thirty-first day of December, 1907, ninety (90) cents per thousand cubic feet.

From January 1st, 1908, until and including December 31st, 1912, eighty-five (85) cents per thousand cubic feet.

From January 1st, 1913, until and including December 31st, 1917, eighty (80) cents per thousand cubic feet.

From January 1st, 1918, until and including December 31st, 1927, seventy-five (75) cents per thousand cubic feet.

The said The United Gas Improvement Company, its successors and assigns, shall be entitled to enforce the same penalties for nonpayment of bills at the offices of the company within five (5) days after presentation as are now in force in the City of Philadelphia, and to the same remedies against consumers for breaches of their contracts for the supply of gas.

But it is distinctly understood and agreed that nothing herein contained shall give to said The United Gas Improvement Company, its successors or assigns, any lien or claim upon a property for a tenant's or occupant's gas bills, or give the right to said The United Gas Improvement Company to refuse to furnish gas to any subsequent tenant or occupant of said property by reason of prior tenant or occupant having failed to pay the bill: *Provided, however*, That said The United Gas Improvement Company, its successors or assigns, shall not be required to furnish gas to any person, firm or body corporate indebted for arrearages due for gas theretofore supplied to them.

In order to provide for the amicable settlement of any disputes or disagreements which may arise between consumers and said The United Gas Improvement Company or its assigns, as to the amount of gas for which bill has been rendered and payment demanded, the correctness of which is disputed by the consumer, said The United Gas Improvement Company agrees, for itself and for its successors and assigns, that it will provide a proper and convenient place or places on the leased property at which its meters may be inspected, with the proper and customary apparatus therefor, for the use of the official and his assistants who may be appointed by the Mayor as Inspector of Meters. Upon complaint of any consumer doubting the accuracy of the bill and declining to pay the same, lodged with such Inspector, alleging that the amount of gas for which the bill has been rendered and payment demanded is in excess of the amount consumed by such consumer, and upon demand thereafter made by the Inspector in writing to The United Gas Improvement Company or its assigns, said The United Gas Improvement Company or its assigns shall disconnect the meter in question and deliver it to the inspection station for examination, where the testing of the meter for the purpose of ascertaining the correctness of measurements shall be made by such Inspector in the presence of the representative of said The United Gas Improvement Company or its assigns. Such tests shall be made according to the established and well-known methods used for such purposes. Any such meter shall be disconnected by said company or its assigns between the hours of eight o'clock A. M. and three o'clock P. M., within 48 hours of the time when said company or its assigns shall receive notice to disconnect such meter for such reasons; and the same shall be tested and returned to said The United Gas Improvement Company or its assigns within twenty-four (24) hours from its receipt at the testing station, bearing a seal, upon which shall be written the report of the Inspector that the meter in question is correct or incorrect, and if the latter, the percentage which it runs fast or slow, and the bill of the consumer about which the complaint has been made shall be corrected according to such finding and report of the Inspector.

Such Inspector of Meters and such assistants as the Mayor shall deem necessary shall be appointed by the Mayor and shall be duly sworn in conformity with the law to faithfully, honestly and diligently perform the duties of their respective offices.

Said The United Gas Improvement Company agrees, for itself and it's successors and assigns, that it will annually and at the beginning of each year of the lease pay to the City of Philadelphia the sum of ten thousand (10,000) dollars towards paying the salaries and expenses of the Inspector of Meters and his assistants, after the same shall be appointed in pursuance of this clause, and also towards defraying the expenses which the city may be put to in connection with tests of gas made in pursuance of Clause 9 of this lease.

When a meter is removed for the purpose of testing the said company shall place a meter in place of one removed at their own cost and expense. The object being that no consumer shall be without light. The type of meter used for the measurement of gas shall be such type as shall be in general use in other large cities in the United States.

Any consumer desiring such test shall, on making his application to such Inspector, pay to him the sum of one (1) dollar, taking his receipt therefor, which amount shall be returned to the consumer if the tests and reports of the Inspector shall show that the meter in question is fast, but otherwise shall be paid by the Inspector into the treasury of the City of Philadelphia.

Bills shall not be rendered more frequently than are now rendered to various classes of consumers.

CLAUSE 12.—The United Gas Improvement Company, its successors or assigns, shall pay to the City of Philadelphia, in each year during the continuance of this agreement, as follows, viz.:

Upon all gas sold prior to January 1st, 1908, all sums received by them in excess of ninety (90) cents per thousand cubic feet.

Upon all gas sold after December 31st, 1907, and prior to January 1st, 1913, all sums so received in excess of eighty-five (85) cents per thousand cubic feet.

Upon all gas sold after December 31st, 1912, and prior to January 1st, 1918, all sums so received in excess of eight (80) cents per thousand cubic feet.

Upon all gas sold after December 31st, 1917, and prior to January 1st, 1928, all sums so received in excess of seventy-five (75) cents per thousand cubic feet.

Statements shall be rendered and payments made under this clause by the lessee to the city as follows: Within twenty-five (25) days after the expiration of each quarter of each year for which any payment is to be made, beginning with the quarter preceding the first day of January, 1898, said The United Gas Improvement Company shall file with the Controller of the City of Philadelphia a statement, sworn to by its President or Vice-President, or by its Secretary or Treasurer, which shall state the quantity of gas measured in cubic feet sold hereunder within the quarter ending with the last day of the preceding month, the amount of money collected for such sales, or for sales in any previous quarter, and the amount of money due and payable to the City of Philadelphia under the provisions of this clause out of such receipts; and shall make payment to the City Treasurer of such amount so ascertained to be due to the City of Philadelphia hereunder within five (5) days after the expiration of said period of twenty-five (25) days. The City of Philadelphia shall have the right at all reasonable hours during the continuance of this contract, by its proper officers, to examine those books of the lessee which show the amount of gas so sold and paid for, so as to verify the correctness of said statements.

Clause 13.—The City of Philadelphia shall have the right at all times, by its proper officers, during the continuance of this lease to enter upon and examine the premises leased, to inspect the same, and to test the candle-power of the gas. Full facilities for these purposes shall be afforded by the lessee.

Clause 14.—No indebtedness of the City of Philadelphia for or by reason or on account of the property hereinabove described, or the operations carried on therein, or with the same, prior to the delivery of the leased property, shall be chargeable against the said The United Gas Improvement Company, its successors or assigns. The same shall be chargeable to and payable by the City of Philadelphia.

Provided, however, That said The United Gas Improvement Company does herewith expressly agree to assume and discharge all contracts made for the Bureau of Gas for the purchase of supplies for the manufacture of gas which have not been delivered prior to the date when this lease takes effect.

Clause 15.—The said The United Gas Improvement Company, its successors or assigns, shall at all times during the continuance of this lease indemnify and save harmless the City of Philadelphia from all loss, injury or damage which may be suffered by said city to or for any person, natural or artificial, by reason of any negligence of said company, its successors or assigns, and the servants, agents or employes thereof, in the use and occupation of the property demised.

Clause 16.—No disputes between the city and the lessee over any of the terms or provisions of this contract shall release the lessee from its obligation hereunder to manufacture and supply gas to the city and its inhabitants in accordance with the terms and provisions hereof during the existence of this lease.

Clause 17.—The United Gas Improvement Company, its successors and assigns, shall furnish gas to consumers in the Twenty-first Ward at the same price and of the same candle-power as it will supply other parts of the city upon the same terms and conditions and subject to the same provisions and obligations as are herein above expressed and set forth.

Clause 18.—In the event of the termination of this agreement in accordance with its provisions at the expiration of thirty (30) years from January 1, 1898, or by the city's election at the expiration of ten (10) years from January 1, 1898, or in the event of failure by the said The United Gas Improvement Company, its successors and assigns, to comply with any of the terms and conditions of the lease for the period of ten (10) days from and after compliance therewith shall have been demanded in writing by the Mayor of the City of Philadelphia, and the termination of this lease for such cause by the final judgment or decree of a court of competent jurisdiction, or in the event of the termination of this lease by the final judgment or decree of a court of competent jurisdiction for any other cause or reason, the Mayor of the City of Philadelphia shall have, and is hereby given the right and power, to immediately enter upon and take possession of the property herein demised.

Clause 19.—Nothing in this lease contained shall be constructed to authorize, permit or consent to the conduct of the gas business in the City of Philadelphia by said The United Gas Improvement Company or its assigns after the expiration of the lease.

Clause 20.—All rules and regulations of the City of Philadelphia now in force regulating the safety of the piping and fixtures of houses or buildings shall be binding upon the lessee or its assigns.

In Witness Whereof, The corporate seal of the City of Philadelphia, party of the first part, hath been hereto affixed, duly attested by the Mayor of the said city, and the corporate seal of the said The United Gas Improvement Company, party of the second part, hath been hereto affixed, duly attested by the proper officers thereof, the day and year first above written.

Sealed and Delivered in the
presence of us: [SEAL.]
C. E. MORGAN, JR.,
JOHN K. MCCARTHY.

CHAS. F. WARWICK,
Mayor.

JAMES BALL,
I. W. MORRIS.

THE UNITED GAS IMPROVEMENT CO.
By THOMAS DOLAN,
[SEAL.] *President.*

Attest: EDWARD C. LEE,
Secretary.

Approved as to form.
JOHN L. KINSEY,
City Solicitor.

BIBLIOGRAPHY.

THE PHILADELPHIA GAS WORKS.

Mayors' Messages and Accompanying Documents.

Report Councils Committee, 1895.

Report Penna. Senate Investigating Committee, 1896.

Briefs, Papers, Books and Reports Philadelphia Committee of One Hundred.

City Government of Philadelphia: A Study in Municipal Administration. Philadelphia: Wharton School of Finance and Commerce, Univ. of Penna.

1. Bureau of Gas—Chapter viii., pp. 99-110.
2. Bureau of Lighting—Chapter viii., pp. 110-111.

The Municipality and the Gas Supply. L. S. Rowe. The Annals of the American Academy of Political and Social Science, Vol. xi., p. 301. May, 1898.

Electric Lighting in Philadelphia. City and State, Vol. I. (July 11, 1895).

C. Walton Swoope. Elec. W. & E., 35-279 (February 24, 1900).

Gas Works, Philadelphia. (A series of addresses in the Twelfth Annual Report of the Citizens' Municipal Association of Philadelphia, by William Potter, Wayne MacVeagh, Edwin S. Stuart and Peter Boyd).
Philadelphia: Citizens' Municipal Association, 1898. Pamphlet.

Some Recent Municipal Gas History.
Edward W. Bemis, Forum 25:72 (March, 1898).
W. E. Dodge, Elec. Eng. 25:207 (February 24, 1898).
William Draper Lewis, Quarterly Journal of Economics 12:209 (January, 1898).
John I. Rogers, Municipal Affairs 1:730 (December, 1897).
Frederic W. Speirs, Citizen 3:201 (November, 1897).
Municipal Affairs 1:718 (December, 1897).
J. H. Stoddard, Star, Vol. xxviii., No. 3, p. 6 (January 15, 1898).
Overland 33:175 (February, 1899).
C. R. Woodruff, Harper's Weekly 41:1038 (October 16, 1897).
American Journal of Sociology 3:601 (March, 1898).
Amer. City Government 1:67 (1896).
Progressive Age 15:414 (September 15, 1897).
Elec. R. 31:152 (September 29, 1897).
Literary Digest 15:751 (October 23, 1897).
Progressive Age 15:521 (November 15, 1898).
American Gas Light Journal 68:212 (February 7, 1898).
Progressive Age 16:91 (March 1, 1898).

Philadelphia Gas Ring, Chapter lxxxix., p. 404, Bryce's "American Commonwealth."

GENERAL HISTORY AND LEGISLATION

United States Electricity Works

(Schedule I)

Data for Chicago prepared by WILLIAM HARD; for Detroit and South Norwalk by JOHN H. GRAY

A—HISTORICAL AND GENERAL.

A 1. Date when this establishment began to sell electricity for lighting.

Chicago. Current first supplied, December 24, 1887; but the municipal electric lighting system does not at present sell its current. It uses it for lighting the streets. In some cases private companies reimburse the city for the cost of maintaining lamps in certain places, but this is distinctly a reimbursement and not a sale, because the said companies are under a legal compulsion to maintain lamps in said places at their own expense.

Detroit. Part of the plant put in operation April 1, 1895. Plant put in full operation October 1, 1895.

South Norwalk. Current supplied October 13, 1892.

A 2. Was current being supplied by private company when city began operation?

Chicago. Apparently not. The streets were lighted, so far as they were lighted at all, by means of gas and oil. The records show no electric lamps rented by the city for public illumination. In fact, there were at that time only a few private electric companies in existence in Chicago, or in territory afterwards included in Chicago. A franchise had been granted by Chicago to the Chicago Sectional Electric Underground Company in 1882. In 1887, the same year in which the municipal system was started, a franchise was granted to the Western Edison Light Company.

Meanwhile, in districts subsequently included in Chicago, a few electric franchises had been granted. It will be seen from these facts that the municipal plant was not started in order to compete with private companies, or in order to deliver the city from exorbitant prices charged by private electric companies for street lamps. In fact, the case goes farther. The municipal system, while started for purposes of public illumination, was not started strictly for street lighting. The purpose in view was river lighting. The first plant was called the river plant. The circumstances in which it was started were as follows: The function of public street lighting was at that time in the hands of the department of public works. Through contracts with private companies, that department maintained a certain number of gas and oil lamps. Meanwhile, in the fire department, there was a Bureau of City Telegraph. This bureau was concerned with maintaining a system of electric signals by which fire alarms were transmitted. At the head of the bureau was an experienced man, J. P. Barrett, who had tried to persuade the private electric companies to put all their wires under ground. He had found overhead wires dangerous to firemen when they tried to enter burning buildings. At the same time, the river was badly lighted and the captains of vessels had great difficulty in navigating it at night time. These two situations—the refusal of the private companies to take immediate steps to bury all their wires, and the need of better illumination for the river, were the causes that led to the establishment of the municipal plant. During the year 1887, Mr. Barrett installed an exceedingly small plant in the basement of a building occupied by Chemical Engine Company No. 1 at the corner of Washington and Clinton streets on the West Side, near the river. This plant had low horse-power engines and low-tension thirty-light dynamos. It was a creditable plant, but it was started in an amateur kind of a way, by a man who was energetic and capable, but not technically an electric light man. Mr. Barrett's specialty was city telegraph, not electric lighting. He started an electric lighting system much as a householder might incidentally start a cabbage patch in his back yard. The casual nature of the inception of the municipal plant should be remembered in considering its subsequent history.

Detroit. Yes.

South Norwalk. Yes.

A 3. Character of original organization, whether individual, firm, corporation, municipal, or other form.

Chicago. The electric light system, as shown above, was originally an incidental venture in the fire department. It was under the direct control of the Fire Marshal through J. P. Barrett, Superintendent of city telegraph.

Detroit. The private company, which still does the commercial business in Detroit, was in previous operation. The present public electric plant was built under the legislation of 1893, and began operations April 1, 1895.

South Norwalk. A private corporation.

A 4. Character of present organization, whether individual, firm, corporation, municipal, or other form.

Chicago. At present the electric lighting system is a bureau in the Department of Electricity, which has five other bureaus.

Detroit. Municipal. Commissioners appointed by the mayor; confirmed by the council; six-year terms, one going out each year.

The board is bi-partisan—not by statute, but by a mutual understanding—the membership being equally divided between the two leading parties. The members serve without compensation. The Michigan constitution does not permit a bi-partisan board by statute.

South Norwalk. Municipal. Three commissioners appointed by the council. There is no statutory requirement as to the political complexion of the board. By a mutual understanding from the beginning the Republicans have had one out of the three members of this board, and the Democrats one out of three places on the water board. The understanding has been so faithfully lived up to that there has been virtually no opposition to the candidates selected in accordance therewith. This was true in the early days when the commissioners were elected by popular vote. For instance, at the election in 1893, the successful candidates for this board—there being two places to be filled because of a vacancy—received respectively 834 and 874 votes. Their respective opponents received 15 each. The city, having originally established its electric plant without specific authority, continued to elect annually the electric light commissioners until the legislature in 1897, in granting a new charter to the city, changed the title of the board to Board of Electrical Commissioners, validated the establishment of the plant, and brought it under the municipal ownership statute of 1893, which provides for the appointment instead of the election of the commissioners. I understand that the appointments have since been on the same principle on which the elections had previously been. Although the present superintendent, Mr. A. E. Winchester, was originally the chief promoter of the plant, the constructing engineer, and for nearly ten years one of the commissioners—resigning July 1, 1902—and from four years previous to that date up to the present time, superintendent of the plant, and although he takes a very active part in Republican politics and always has done so, I have not been able to find that political considerations have at any time had any influence in the appointment, promotion, disciplining, or dismissing of any member of the force, or with the operation of the plant. It ought also to be said that a large part of the success of the plant and of the enthusiasm with which it is regarded by the public are due to the personal activity and character of Mr. Winchester. His career in connection with the plant and his dominating influence over its fortunes are unique so far as my observation goes. I understand that Mr. Winchester in the early days served the city in connection with the establishment and management of the electric plant without any salary at all, and in recent years has served as superintendent for a smaller compensation than he could command elsewhere. I believe, also, that every extension and enlargement of the works recommended by him has been speedily authorized by the city, and that in no case has the expense of the work exceeded his estimate as presented to the city meeting. In fact, he has always come well within every special appropriation made for investment, except one for $5,000 for meters, in which the original estimate was not exceeded.

A 5. Date and character of all changes in ownership since origin.

Chicago. From 1887 to 1897 the municipal electric lighting system continued to be managed by Mr. Barrett as part of the City Telegraph Bureau of the Fire Department. The original purpose of the system was soon expanded. During the first year the only illumination furnished was at the points where the streets crossed the river, and the persons whose benefit was sought were river captains rather than pedestrians. The total number of lamps operated was about 100. The wires were strung along the river bed between the dock line and the building line, thus proving that even under unfavorable conditions it was possible to get rid of overhead electric obstructions. So the object lesson which was one of the two reasons for constructing the plant was taught. The river being lighted (along its most frequented part) and the possibility of under-grounding having been demonstrated, it was not long before it occurred to Mr. Barrett that this new enterprise might furnish a satisfactory substitute for some of the gas and oil lamps used for lighting street corners. He met with much opposition in this design, and, after the manner of the founders of most enterprises, was obliged to lay hands on men, money, and materials wherever they were handiest. He impressed city employees who for any reason were temporarily released from their ordinary duties. He took money from any appropriation which seemed to have more than it needed and from which a diversion was possible; he commandeered any city material which was not being used by any one else. His object was not to keep books, but to get the system going. The opposition to it was so strong on the part of the private lighting contractors, who did not want to see the gas and oil lamps superseded, that the need of the times was for resourcefulness rather than computations. On Christmas eve, 1888, just a year after the opening of the first plant, a second plant was started on Jefferson street, a short distance south of the site of the first plant at Washington and Clinton streets. The second plant, on Jefferson street, was the first street-lighting plant, and the river-lighting plant was soon consolidated with it. When the power was applied to the consolidated plant, there were 279 lamps in operation. The machinery of the plant still consisted of small units, and, therefore, was not economical in management. Mr. Barrett, however, was not to blame. The appropriations under which he worked were not large enough to enable him to install large units. In fact, it might be said in general that the municipal electric lighting system has never had money enough to be economical. It has been obliged to content itself with spending small sums on equipment when it was only by the expenditure of large sums that economical arrangements could be made. The difference between a private system, backed up at its inception by large capital, and this amateur municipal enterprise, handicapped by selfish opposition and by small funds, is extremely marked. Add to this the low salaries paid by the city and the sloppy methods of accounting, which even now are prevalent in the city hall, and it is quite clear that apologists for the municipal lighting system will have several things to explain. During the year 1889 Mr. Barrett sketched out a lighting system which has not even yet been completely constructed. He divided the city into 12 districts, each to have a central station, and he built certain subways and feeders for cables. During the course of the next year (1890) he opened four stations. The first of these, on Throop street, on the West Side, not far from the Jefferson street plant, was opened on March 17, and immediately took over the lamps for which the latter plant had previously supplied the current. The second, which reached completion a few days earlier, was at the corner of Chicago avenue and Sedgwick street, and was opened on the 22d of February. The third, at the corner of Rice and Lincoln on the Northwest Side, was opened on March 26. The fourth, at the corner of Indiana avenue and Fourteenth street, was opened on December 24.

It will be noticed that up to this time Mr. Barrett had opened three plants on Christmas eve, one on Washington's birthday, and one on St. Patrick's day. The sixth was opened on March 26, which is probably the anniversary of something, although I don't recognize it. By the end of the year 1890, therefore, the municipal electric lighting system had built six plants, and discarded two, leaving four in operation. The two discarded plants had been in fire department buildings. The four being operated were in buildings constructed expressly for electric lighting purposes. Two of the lots occupied by these buildings had been bought expressly for such purposes. The other two were borrowed from the water department. The water department had them, and was not using them. If it had been suggested to Mr. Barrett that the interest on the cost of these lots, including those belonging to the water department, was an item in the cost of each arc lamp, he might have admitted it, but the fact is that it is hard to prove that Mr. Barrett was at this time interested in keeping any accounts at all. His reports on the electric lighting system are merely parts of his annual reports on the bureau of city telegraph, of which he was the head. They appear in the annual bound reports of the fire department. Almost nothing is said in these reports about the cost of the system, and an accountant's history of these early days of the electric lighting system has to be drawn from a reassemblement of scattered vouchers.

During the years 1891 and 1892 the system remained just about stationary, making no progress toward expansion, except that the number of arc lights increased slightly, reaching, according to Mr. Barrett's reports, the total number of 1,102 at the end of the year 1892. In the course of the year 1893 the Throop street plant, including land, building and equipment, was sold to the Metropolitan elevated company, which needed the site. The compensation paid by the Metropolitan was $100,000 plus seven lots on West

Polk street. The $100,000 went into the general treasury of the city; the seven lots became general city property. They are now credited to the Small Parks Department in the Comptroller's annual report for 1904. Neither the comptroller nor the present department of electricity ever makes any real effort to show the consequences of such transactions upon the financial history and present value of the electric lighting system. For some years after the sale of the Throop street plant the electric lighting system continued to operate it while it was constructing a new plant not far away on Halsted street. The land for this Halsted street plant was bought, and now belongs to the electric lighting system.

Also during the year 1893 the Rice and Lincoln plant on the Northwest Side was temporarily abandoned for purposes of economy, and the machinery was transferred to the plant on the North Side at Chicago avenue and Sedgwick street. If the city had had money enough to extend the lighting system on the Northwest Side according to its original intention, it would not have been necessary to make this transfer. It would have been increasingly economical to operate a Northwest Side station. As things were it became more economical to abandon the station and to concentrate. During the year 1894 the situation remained unchanged. Three stations were operated: the North Side station at Chicago and Sedgwick, the South Side station at Indiana and Fourteenth and the West Side station on Throop. The Halsted street station, to take the place of the Throop street one, was being planned for.

For all the years from 1887 to 1894, a report on the electric lighting system can be found in the report of the fire department; but for the year 1895, while the report of the fire department was issued as usual, and while the report for the Bureau of City Telegraph, with Mr. Barrett's name affixed, is included in the fire department volume, there is not a word to be found anywhere in it about the electric lighting system. The fire marshal had quarreled with Mr. Barrett about the electric lighting system. It is said that he thought Mr. Barrett was trying to get his electric lighting system made into a separate municipal department. It is also said that the fire marshal thought Mr. Barrett was trying to make a good showing for the system by using the labor of city employees whom he (Barrett) did not charge up against the electric lighting system; that is, the fire marshal thought that other features of the city government were paying for part of the labor that Mr. Barrett was using, and that Mr. Barrett was refraining from mentioning that fact. Whatever the cause of the quarrel may have been, however, the interesting fact is that the fire marshal punished his too-ambitious subordinate by excluding his subordinate's hobby from the annual report. In other words, he satisfied his resentment by omitting all mention for the year 1905 of one of the most important activities of the city government. The gorgeous irresponsibility of such a revenge is an excellent commentary on the tone of the environment in which the electric lighting system grew up. During the year 1896 the same condition of affairs persisted. There is no electric lighting report for that year. About the middle of the year 1897 Mr. Barrett retired on a pension. He had been a member of the fire department for a great many years, and his annual pension amounted to a comfortable income. He is still living in Chicago.

Carter Harrison, Jr., became mayor of Chicago in 1897 for the first time. He appointed Mr. Edward B. Ellicott to take Mr. Barrett's place as superintendent of city telegraph. Mr. Ellicott was a personal friend of Harrison's. He had not previously been in the city employ. He had been in the electrical business for many years, and at the time of his appointment he was superintendent of construction for the Western Electric Company. He was a fishing and hunting companion of Harrison's. He was not a politician in the sense of controlling any district or any delegation, or of being influential in controlling any such district or any such delegation. For six months Mr. Ellicott was superintendent of city telegraph. Then, at the beginning of the year 1898, a department of electricity was established with the city electrician at its head, and Mr. Ellicott was appointed city electrician.

The Department of Electricity to-day consists of six bureaus:

(1) The Bureau of Electric Lighting.
(2) The Bureau of Fire Alarm Telegraph.
(3) The Bureau of Police Alarm Telegraph.
(4) The Bureau of Gas Lighting.
(5) The Bureau of Electric Inspection.
(6) The Bureau of Automobile License.

(Accountant's Schedule IV., I 23, gives but 4 bureaus. Gray.)

Mr. Ellicott was City Electrician from 1898 to 1905. In 1905 he resigned to accept a position with the Sanitary District. He was succeeded by William Carroll, the present incumbent. The municipal electric lighting system has, therefore, had only three masters since its inception in 1887.

In the beginning of the year 1898 Mr. Ellicott got out a report covering the work of the year 1897. This is the first report issued separately from the report of the fire department. Since that time the department of electricity has, of course, issued a report annually. For the years 1895 and 1896, however, the gap cannot be supplied. During Mr. Ellicott's incumbency the station at Fourteenth and Indiana was abandoned in order to light a larger district by the opening of the Robert A. Waller station at a point much farther south on Wentworth avenue, near Sixty-third street. Similarly the plant at Chicago avenue and Sedgwick street was abandoned, and a new plant was opened further north on the North Side at Fullerton avenue and the river. Meanwhile machinery had been again installed in the plant at Rice and Lincoln, so that to-day the Bureau of Electric Lighting is operating four plants, as follows:

(1) North Side, H. N. May plant, Fullerton and the river;
(2) Northwest Side, plant number eight, Rice and Lincoln;

(3) West Side, plant number six, Halsted and Blue Island; (4) South Side, R. A. Waller plant, Wentworth and Sixty-third.

Plants No. 6 and No. 8 get their names from the original numbers given to the imaginary districts outlined by Mr. Barrett. The other two plants take their names from men prominently connected with the operation of the municipal government of Chicago. The sites of the R. A. Waller plant, of Plant No. 6 and of Plant No. 8 are owned by the department of electricity. The site of the H. N. May plant is owned by the water department. The department of electricity also uses as a repair shop the old building at Chicago and Sedgwick formerly used as a lighting station, the site of which belongs to the water department.

The department of electricity, therefore, for electric lighting purposes, owns three pieces of real estate, and uses two belonging to the water department. It also rents at $2,500 a year a tract belonging to private persons, with the understanding that at the death of the owners it shall come into the possession of the city. The tract is just north of the Halsted street plant, and is used as a storeroom and repair shop. Altogether, the municipal lighting system has operated nine plants, and has abandoned five of them.

The financial aspects of these real estate holdings will be considered later.

Detroit. None.

South Norwalk. The Norwalk Gas Light Company, acts of 1856 (special), by amendment of charter, April 7, 1887, was authorized to furnish electricity. On February 18, 1892, by contract it sold its electric rights and property to the Norwalk and South Norwalk Electric Light Company, which was created by special charter April 20, 1887. August 12, 1891, a city meeting, called under the statute, appointed a committee by vote of 8 to 12 to consider the subject of a public electric plant. This committee reported to a similar meeting August 25, 1891, in favor of a city plant, and it was voted to recommend to the council an appropriation of $22,500 for that purpose. The vote was 51 to 14. The council made the appropriation March 7, 1892. This was approved by city meeting March 23, 1892, by a vote of 157 to 80.

The plant was erected, and began to supply electricity for public use only on October 13, 1892. On June 29, 1901, the city bought of the Connecticut Railway and Lighting Company, owners of the Norwalk Tramway Company's franchise, the electrical apparatus that it used to furnish electricity for motive power under a special agreement with the Electrical Commissioners. The consideration paid by the city under the contract of June 29, 1901, was a nominal one—said to be from $25 to $80.

October 18, 1897, the city council voted an appropriation of $20,000 to enlarge the electric plant in order to furnish commercial lighting. A city meeting of October 26, 1897, approved the action of the council by a vote of 62 to 20. A city meeting of

March 7, 1898, authorized the council to issue bonds to pay for this extension. A special act of the legislature of May 28, 1897, validated this action of the city.

A 6. State method of making each change.

A 7. State terms of each arrangement.

A 8. State fully reasons for each change.

Chicago. Answered under A 5.

Detroit. No change.

South Norwalk. At the time the city decided to build its plant, it had a five-year contract, dating from September 21, 1891, terminable at the option of the city at the end of one year, for the street electric lighting, with the Norwalk Gas Light Company, which had assigned the contract to the Norwalk and South Norwalk Electric Company. The city denied the legality of the assignment.

(8) There seems to have been a general dissatisfaction with the service supplied by the company, which was furnishing 81 nominal 800 candle-power lamps from dusk to 1 A. M. at $57.26 per year, and was under agreement to furnish gas light from 1 A. M. to daylight, five foot burners, for 5c. per light per night, and 1c. per hour for additional time. Apparently no gas was furnished.

A 9. Has there ever been municipal ownership and private operation of the plant?

Not in any one of the cities.

A 10. Is the general sentiment favorable or unfavorable to the present system of ownership and operation?

Chicago. There has never been any serious attempt to transfer the electric street lighting system to private hands. Besides operating its own lamps, the city rents certain lamps from the private electric light companies. The cost of these rented lamps is so much greater than the *apparent* cost of the municipally-owned and operated lamps that there has never been any serious disposition on the part of the public to entrust the whole electric street lighting business to companies. It has been felt by the city authorities that the mere existence of the municipal plant was a safeguard against extortion.

Detroit. Apparently generally favorable.

South Norwalk. The sentiment seems to be universally favorable.

A 11. What is the attitude of the press?

Chicago. There have been no picturesque scandals in the municipal electric lighting system, and consequently there has been comparatively little newspaper notoriety about it. There have been very few politicians connected with the system, and, therefore, it has furnished comparatively little political news. The press commented at some length on the Haskins and Sells report, which in 1901 showed that from the accountant's standpoint the department of electricity failed to include certain important items in estimating the cost of each arc lamp per year. These items were: depreciation, insurance, taxes, interest and water. Whenever municipal ownership is discussed the radical newspapers quote the cost per arc lamp without these items, and the conservative newspapers quote it after including them, and after commenting on the slovenliness and unreliability of city statistics. The conservative newspapers, however, do not suggest the transfer of the system to the private companies, and the news columns of the newspapers, as distinguished from the editorial columns, pay almost no attention to the municipal electric lighting system. That system runs along year after year without any scandalous incidents of any consequence, and the result is that it has never been the subject of any such exposés as have marked the history of the water department, the police department, the building department, the health department, etc. In fact, it may be said that the department of electricity furnishes fewer good news stories than any other department of importance in the city hall. The attitude of the news editors is, therefore, one of indifference.

Detroit. Favorable. The editor-in-chief of one of the important papers (Hetherington, of the Journal) is a member and an ex-president of the lighting commission.

South Norwalk. The single paper published in the city is, and always has been, an enthusiastic supporter of the public plant. The "Hour," published in Norwalk, the adjoining municipality, is not unfriendly, and supports the public ownership in South Norwalk apparently with the view that that plant enables Norwalk to make better terms with the private company.

A 12. State current objections to the system.

Chicago. The most important current objection is to the methods of accounting employed by the city in estimating the cost of each arc lamp per year. There is little objection to the manner in which real money, as distinguished from book charges like interest, is expended. It is felt, of course, that the department of electricity shares in the general inertia of the city hall methods compared with private methods, but there has been no scandalous padding of payrolls, and there has been no profligate disbursement of public moneys. The fault has rather been that the conduct of the department has run along below the level of the verve and courage of private enterprises. The reasons why the city falls below will be discussed later, as will also the question whether or not this relative lack of efficiency is not compensated for in the case of the department of electricity by its having escaped from the need of paying excessive profits to investors, and also from the need of standing the political expenses incident to the acquisition of a franchise. The political editor of one of the best Chicago papers says that the history of the department of electricity has been one of "uneventful mediocrity." This is not quite fair to the men who have been at the head of the department, but when the whole city hall system with which they worked is considered, it is evident that they have been sadly hampered by their lethargic environment.

Detroit. I have discovered no serious criticisms of the management. It is possible that there is an undue conservatism in retaining old machinery. This is doubtless due to the desire to keep down the apparent expenses of the public lighting, and a disinclination, therefore, to go to the council for increased but necessary appropriations.

South Norwalk. No objections are made except by the opposing private interests, who allege that prices are too low, and the cost too high, and that improperly small amounts are written off for depreciation, and that some of the machinery is antiquated.

A 13. Do citizens take an active interest in the management of the plant?

Chicago. It can hardly be said that they do. The attention of investigating bodies like the Citizens' Association and the Civic Federation is, of course, directed to the most diseased and inflamed parts of the city government. There is no record of any such personal attack upon the management of the department of electricity as has been made by reform associations upon almost every other department of the city government. Therefore citizens know little about the department. This in itself is significant. It shows just how much enthusiasm a man arouses by conducting his department with average efficiency and decency.

Detroit. The plant appears to attract but little attention, favorable or unfavorable, yet the people when questioned declare that they do not desire a change.

South Norwalk. The citizens seem to take an enthusiastic and indeed admiring interest in the plant. In fact, the plant seems to be the one thing in South Norwalk in which the citizens take more pride and interest than in anything else in the city.

A 14. Have there ever been competing electric light companies in the city?

Chicago. Yes; a good many. They have never competed with the city plant because the city has confined its attention to street lighting, but they have competed with each other in furnishing light to private consumers.

Detroit. Yes.

South Norwalk. Since 1887 the Connecticut Railway and Lighting Company, or the companies which have been absorbed by it, have had the right to furnish electricity for all purposes. This company furnishes some 10 to 20 customers with light, but the city prices are so low that no attempt at general competition is made. The company does the lighting in adjoining municipalities, but has not for several years attempted to increase the number of its customers in South Norwalk.

A 15. Are there competing companies now?

Chicago. There are. See answer to A 16.

Detroit. No. The private company does the commercial business; the public plant, the public lighting.

South Norwalk. Answered under A 14.

A 16. If private companies have consolidated, give dates and methods briefly.

Chicago. At present the only two companies which have a widespread business are the Edison company and the Commonwealth company, and these two companies are, for all practical purposes, one company. The history of consolidation in the lighting business in Chicago is as follows: Electric lighting franchises began to be granted in Chicago and adjacent towns and villages about 1882. In 1887 a franchise was granted to the Western Edison Company. This franchise was immediately transferred to the Chicago Edison Company. The Chicago Edison Company had a franchise only within the limits of the city as constituted before the great annexations of 1889. In other words, the Chicago Edison franchise is confined to what is now the central portion of the City of Chicago. The Chicago Edison Company ran from 1887 to 1893 without any consolidation. In that year it was united with the Chicago Arc Light and Power Company by the unanimous vote of the stockholders of both companies. This Chicago Arc Light and Power Company has never had a franchise of its own, but it had bought up the franchises and properties of a large number of other companies doing business in the central portions of the city. The most important of these companies bought up by the Chicago Arc Light and Power Company was the Chicago Sectional Electric Underground Company. By the union between the Chicago Edison Company and the Chicago Arc Light and Power Company in 1893, a great many enterprises were brought together. Since 1893 the name of the consolidated company has been "Chicago Edison Company."

Nothing further of interest happened until 1897. In that year a speculative franchise was secured by politicians in the name of the Commonwealth Electric Company. The franchise of this company was hawked about the streets until in self-defense the Chicago Edison Company bought it up. It was a valuable franchise because it covered the whole city. The first use made of it by the Edison company was for the purpose of buying up the franchises and properties of small electric lighting companies operating in Hyde Park, Lake View and other territories that had been annexed in 1889. The stock of the Commonwealth is owned by stockholders of the Chicago Edison Company, for the benefit of all the stockholders of that company. The big business of Chicago is done by the Chicago Edison and Commonwealth companies. All other companies, with one exception, have franchises which cover only a limited territory. The exception is the Cosmopolitan company, which has a franchise, granted in 1895, covering the whole city. This company has never made any serious attempt to extend its business in area beyond a few blocks. Its franchise was passed in bad company, under suspicious circumstances. It is a telephone franchise as well as a light, heat and power franchise, and it is assumed that its owners are waiting for a favorable opportunity before they use, or threaten to use, the full powers which they enjoy.

Detroit. No real consolidations. All the commercial electric lighting in Detroit is now done by the Edison Illuminating Company, organized April 15, 1886, under the general laws. It obtained its franchise July 13, 1886, and a supplementary one November 19, 1889. The Brush Electric Light Company, organized under the general law (1881), sold to the Peninsular company in 1891. The Peninsular Company was reorganized June 17, 1898. This company operated under the old Brush company franchise, approved March 18, 1882. The Edison Illuminating Company bought the Peninsular Company in 1898 at bankrupt sale for $857,000 (the Peninsular Company at the time had out $600,000 worth of bonds, which were not assumed by the purchaser). In 1889 the Brush Electric Light Company bought at mortgage sale the Excelsior Company, which had a franchise of May 10, 1884, which was never exercised. The Edison Illuminating Company bought the Detroit Electric Light and Power Company at foreclosure sale in 1900 for $198,000. This company was operating under a franchise of October 16, 1889, as amended May 17, 1897. The franchise of the Edison Electric Light Company (which apparently was never acted on by that company), dated February 28, 1881, has passed into the hands of the Edison Illuminating Company.

The Detroit Edison Company is a New York holding corporation, and also a company which sells in bulk to other companies. It has no franchise, and distributes no electricity to individual consumers. It furnishes power to the Michigan Central Railway. The exact relation of this company to the Edison Illuminating Company I was not able to determine. Its charter authorizes it to hold stock in other companies, and it is said to have such stock holdings.

The commercial electric lighting business is actually all under the control of the Edison Illuminating Company, which ostensibly operates under the two ordinances, that granted directly to it, and that granted to the Peninsular (the old Brush Company). It never has claimed privileges under the other franchises purchased by it; yet, if controversy should arise and the company deemed it advantageous to do so, it probably would claim that the other franchises are still in force.

Under the public lighting act of 1893, the commissioners had the right to grant revokable licenses to any one to furnish electricity. Apparently, that to the East Side Company, capital $20,000, was the only one ever acted upon. The Edison Illuminating Company has bought this up. The Edison Illuminating

Company is a licensee of the parent Edison Company, but according to the oral statement of Mr. Dow, president of the company, the parent company holds no stock in the local company, but, as Mr. Dow expresses it, the arrangement consists in the General Electric Company being a preferred manufacturer, and this Edison Company being a preferred customer.

See Secs. 8551 and 8552, Revised Statutes (ed. of 1897), also act 112 of 1889, p. 126; approved May 24.

South Norwalk. The Connecticut Railway and Lighting Company now controls all the urban transportation and electric lighting (except that done by the city) and the supplying of gas in South Norwalk, as well as most of the similar enterprises in this part of the State. The Norwalk Gas Light Company was chartered by joint resolution of the general assembly in 1856. The charter was amended by special act (1856), and further amended April 7, 1887, giving the right to furnish electricity for all purposes. The Gas Supply Company was chartered by joint resolution July 2, 1895. The charter was amended May 2, 1899, and name changed to the Connecticut Lighting and Power Company, with the right to operate in any part of the state. This amendment gave the company the right to operate and to buy, sell, hold and dispose of the stock, bonds and franchises of companies engaged in the same or similar business, including gas, electricity, water and steam. By joint resolution of April 30, 1901, the charter was amended and the name changed to the Connecticut Railway and Lighting Company, under which the company now operates. This company has absorbed the Norwalk and South Norwalk Electric Light Company, chartered by special act, April 20, 1887, and the following companies which had rights in South Norwalk: The Norwalk Street Railway Company, chartered June 19, 1895, as successor to the Norwalk Horse Railroad Company, incorporated May, 1862, and name changed by the Superior Court of the County of Fairfield, April 30, 1894. Amendments to the charter of the Norwalk Horse Railroad Company: June 25, 1869; July 27, 1871; July 30, 1872; Joint Resolution No. 60, March 30, 1886; Acts of 1893; Joint Resolution June 19, 1895, changing the name to the Norwalk Street Railway Company; June 25, 1895, amending the charter of this company and also of the Norwalk Tramway Company, chartered May 6, 1889. Amendments to the charter of the Norwalk Street Railway Company: May 25, 1891; amendment to the charter of the Norwalk Tramway Company, June 29, 1893, and June 20, 1899. On June 30, 1901, the purchase by the Railway and Lighting Company of all the companies mentioned in the answer to this question and of nine other companies in adjoining territory was confirmed by the legislature.

A 17. Give status of present companies.

Chicago. See answer to A 16. The Edison and Commonwealth companies can work very well together, because the Edison franchise is used for the central portion of the city, and the Commonwealth, covering the whole city, can be used by the Edison to round out its business in the outlying territories.

Detroit. Answered under A 16.

South Norwalk. The public electric plant is independent. The Connecticut Railway and Lighting Company controls everything else.

A 18, 19 and 20. Population at last national census, and estimated population January 1, 1906, with source of such estimate.

Chicago had in 1900, 1,698,575, and according to the estimate of the city directory, for 1905, 2,273,000. "This was, of course ridiculous" (Hard). The Health Department estimate, based on the percentages of the United States census bureau, was, for January 1, 1906, 1,990,750. "This may have been a little bit too low" (Hard).

Detroit. Population, census of 1900, 285,704. On January 1, 1906, estimate of city directory, 438,450.

South Norwalk. By census of 1900, 6,591. On January 1, 1906, 7,275, estimate of City Clerk. No local census taken since the Federal census.

A 21. Are there gas works in the city which compete with electricity?

A 22. Are these public or private?

Chicago, Detroit, South Norwalk. Yes, private, for all three cities.

A 23. If private, are they owned or controlled by the same persons controlling electric works?

Chicago. It is said that some men have investments in both the gas and the electric business in Chicago, but I have found no conclusive evidence as to any connection between the "Gas Trust" and the Chicago Edison Company.

Detroit. So far as publicly known, not so controlled. The gas company is a Michigan corporation, all the shares of which are owned by the American Lighting Company, a New Jersey corporation.

South Norwalk. The Connecticut Railway and Lighting Company owns everything except the municipal electric plant.

B—SUPERVISION OF MUNICIPALITIES.

B 1. Does municipality have power

- (*a*) To construct its own electric plant, when there is no private competing plant?
- (*b*) To construct its own electric plant without purchasing existing private plant?
- (*c*) To condemn private plants under the right of eminent domain?
- (*d*) To purchase private plant?
- (*e*) To operate the plant when constructed or acquired?
- (*f*) To condemn property for additions to plant?

B 2. How was the power conferred, by

(*a*) General law applicable to all cities in the State? or
(*b*) General law applicable to all cities in a class? or
(*c*) Special act applicable to this city alone? or
(*d*) Administrative order (explain)? or
(*e*) Other methods (explain)?

Chicago. The law on the subject disregards the existence or non-existence of private plants; but under the city and village act (1872), Art. 5, Sec. 1, Par. 11, the city is given the power to light its streets. The corporation counsel's office is of the opinion that in the absence of legislation to the contrary, this provision gives the city the right to construct a plant. Certainly there is no other legal provision under which the actual fact of an already-constructed municipal plant could be explained. The legality of this plant has never been questioned. The state legislature of 1905, in enacting the law of May 18, 1905, assumed and ratified the legality of the plant. It provided that the city "shall have power and authority to sell surplus electricity for heat, light and power, within the corporate limits of said city." This power to sell surplus electricity has not yet been used. Plans are being prepared to that end, but at present all the current produced by the municipal plant is being used for street lighting.

Under the above-quoted legal provisions, according to the corporation counsel's office, the city certainly has the power to construct its own plant without purchasing any or all existing private plants, but it can use this power only to provide electricity for its own public demands. It cannot construct a plant for the purpose of selling electricity to private consumers. It can only construct a plant for street lighting and other incidental municipal purposes, and then, in case there is surplus current, let private consumers have the benefit of it.

(*c*) According to the corporation counsel's office, the city does not enjoy the right to condemn private plants in case the plant is already used for selling current to private consumers. It might possibly enjoy such a power if the plant were purely for street lighting and other public purposes. This question, however, is in both cases debatable.

The city has the right to purchase private plants for its own use, but not for surplus, and to operate the same. It is doubtful if it could condemn property for additions under the provisions just cited.

The power to light the streets is conferred by the general city and village act. So far as surplus current for sale to private consumers is concerned, the act of May 18, 1905, conferring the power to sell surplus current, is applicable to Chicago only.

Detroit. The city may construct its own plant where there is no plant, or construct its own plant without purchasing existing private plant, but has not the right to take private plants by condemnation. It may, however, purchase private plants, and, after purchase, operate them; and condemn private property for additions to the plant.

All the legal powers in these matters are conferred by special legislation applicable to this city alone.

South Norwalk. The city may construct its own plant where there is no private competing plant, but is required, under the act of 1893, to purchase existing private plant if the company wishes to sell. It probably has not had the right to condemn private plants. The matter has never been ruled upon; but under Connecticut practice cities run to the legislature in each case for a special act for anything they wish to do. Under the act of 1893 the city may purchase and afterwards operate a private plant, and may condemn property, under its charter, for additions to the same. The city, having established its plant without any legal authority, obtained in the special charter granted it by act of May 28, 1897, a specific confirmation of its previous action, and a statutory declaration that the city in this matter was subject to the general law of 1893 on this subject, except as that law is modified by the special provisions of its charter, secs. 65 and 66.

B 3. Does the municipality have power, for the construction or acquisition of electric lighting works, to raise money by
(*a*) Taxation?
(*b*) Sale of bonds?
(*c*) Other methods?

Chicago. May raise money both by taxation and bonds. The act of June 21, 1883, provides that the legislative authority of each city, village and town in the state of Illinois, with the concurrence of two-thirds of the members thereof, shall be authorized to levy and collect annually upon taxable property a tax of not exceeding three mills on the dollar to be used exclusively for lighting streets. Bonds may be issued for purposes of general improvement, including the lighting of streets.

(*c*) The street railroads in some cases have been obliged, as compensation, to pay certain sums of money annually for the extension of the electric lighting system.

Detroit. The city may raise funds for these purposes by taxation and also by sale of bonds.

South Norwalk. There is not, and never has been, a limitation in South Norwalk on taxation. The city may levy taxes for any lawful purpose. The general act of 1893 authorizes the purchase and extension of such plants by bonds, but not by other forms of indebtedness. Bonds must not be sold below par, must not run more than 30 years, and must not bear interest above 5 per cent. All bond issues and annual appropriations must be approved by popular vote, and special appropriations require a public hearing. Notwithstanding this act of the legislature, extensions of the electric light plant have usually been made in whole or in part from the proceeds of promissory notes. The electric light commissioners are able to size up public sentiment as voiced at city meetings, and thus make extensions from the proceeds of notes instead of bonds, with the consent of the city meeting, on the alleged ground that this gives them a better opportunity to apply their surplus earnings at any time to reducing their debt, and thereby save interest to the city. The annual published reports of the electric light department usually show a large amount of notes outstanding for extensions. (See proceedings of city council, December 17, 1900; also report of the city of South Norwalk, year ending June 1, 1905; and also the report of the special city meeting of August 31, 1905.)

B 4. What is the limitation upon the city's taxing power for municipal electric lighting works?

B 5. What is the limitation upon the general taxing power of the city?

Chicago. See answer to B 3. The city has never used its power to levy a special lighting tax under the act of June 21, 1883. The money for the electric lighting system is taken out of the general corporate fund, produced by general taxation, licenses, etc. Under the Juul law of 1901, the sum of all taxes in Chicago shall not exceed 5 per cent. on the taxable valuation. The taxable valuation is 20 per cent of the full value. There are three taxes which fall outside the operation of the Juul law. These are the state tax, the school building tax, and the sanitary district special tax.

All other taxes come within the Juul law. This means that the city tax, the school-operation tax, the park tax, the library tax, etc., must not altogether exceed 5 per cent. on the taxable valuation. The city, according to a law passed in 1905, cannot be given less than 1.8 per cent. It may be granted as much as 2 per cent., plus the amount necessary for the interest on its debt, and for sinking fund.

The money for the department of electricity comes entirely from the city.

Detroit. There is no special tax limit for lighting purposes. It is impossible to say what the limitation on the general taxing power of the city is. The city charter (Sec. 233) establishes 16 distinct funds. For some of these funds there is a limit in percentage; for some others, a limit in a lump sum of dollars, and for some, such as the lighting fund, for example, it is declared that the tax for any one year shall not exceed the estimated cost of the public lighting for that year, which seems to make the rate for these purposes depend on the estimate of cost, without other limit.

South Norwalk. There is no limit for either lighting purposes or for general purposes, but in both cases taxes must be approved by popular vote.

B 6. What is the limitation upon the city's power to incur debt for municipal electric lighting works?

B 7. What is the limitation upon the general power of the city to incur debt?

Chicago. No specific limitation for municipal electric lighting works. Under the state constitution of 1870, no county, city, township, school district, or other municipal corporation, is allowed to become indebted for any amount in the aggregate exceeding 5 per cent. of the value of the taxable property therein.

Detroit. No special limit for public electric lighting works, except that, under the special acts authorizing the establishment of the works (1893), the cost was not to exceed $800,000.

The debt limit for all purposes is 2 per cent., not including the water debt, and making allowance for the amount in the sinking fund.

South Norwalk. The city is limited to a debt of 5 per cent. on the assessed valuation, exclusive of the water debt, with no special provision in regard to electric lighting.

B 8. State fully, step by step, the procedure which must be followed, and the requirements which must be met before the city may construct or acquire a plant; also source of each provision, whether state constitution, statute, or ordinance. Note particularly requirements as to initiation of proposal, special action by city authorities before its adoption, mayoralty veto, referendum, publicity, making of appropriations, bond issues, and approval of scheme by courts or state authorities.

Chicago. The state laws above mentioned show the powers which the city enjoys. In order to apply these powers there is needed a vote of the city council making an appropriation for the purposes in question. In all cases in which a liability is involved the yeas and nays must be taken (city and village act, Art. 5, Sec. 1, Par. 13). All ordinances for the expenditure or appropriation of money must get a majority of the total number of persons elected to the city council. An appropriation for electric lighting purposes is passed just like an appropriation for any ordinary municipal purpose. So far there has been no case in which a private electric lighting plant has been bought by the city. The city has constructed all of its own plants. The appropriation of money for the purpose of constructing these plants has not differed from the appropriation of money for any other purpose. The mayor has the same power of veto that he has over any other subject, and a two-thirds vote is required to override him. No referendum is required. Any part, or the whole, of a bond issue for general improvements might be used for the construction of municipal electric lighting plants. These bonds are not issued by the department of electricity. They are issued by the general city government. The limitation on indebtedness is discussed above. Any action of the council is of course subject to the review of the courts if properly brought before them, but there are no special provisions about a review of electric light matters. There are no specific legislative provisions with regard to the acquisition of plants by the city. Under the power of lighting the streets conferred upon it by the city and village act, the city has proceeded to construct its own plants, and the question of condemning private plants has not arisen. Under the city and village act, however, as amended in 1905, the city has the power to exercise the right of eminent domain in the acquirement of property desirable for municipal purposes. The form of procedure under eminent domain in such cases shall be as nearly as may be like that provided in the case of local improvements.

Detroit. It is a little hard to say whether this question calls for a description of how the present public plant was established, or how, under changed methods of procedure, a plant would be established if the city had no plant to-day. As early as 1891 a general public lighting act applying to all the cities in the state under 25,000 population was passed (No. 115, June 1, 1891). The act gave the right to purchase or construct and operate both gas and electric plants, for both public and private use. This act was amended at the same session (No. 186, Acts of 1891, July 2, 1891). The amended act authorized the cities to contract for the public lighting as well as to erect their own works. The title of the amended act does not refer to furnishing light to the inhabitants, but only to the public lighting, but the language of the act itself certainly includes private lighting, as well as public. The first act required a two-thirds majority by popular vote; the amendment, a simple majority. The act, however, did not apply to cities of more than 25,000 inhabitants.

When the late Mayor Pingree became mayor in 1890, he was determined that Detroit should have a municipal electric lighting plant. He plead for this with great force in each of his four annual messages—1890 to 1893 inclusive—until, largely under his influence, the act of March 18, 1893, gave the city the full right to purchase or construct, and to operate an electric lighting plant, for public lighting only. The act also gave the city, if it desired, the right to contract for the public lighting instead of establishing its own system. It provided for a public lighting commission of six members, six-year terms, one going out each year, to be appointed by the mayor and confirmed by the council. The act provided that the portions of the plant to be situated on public property, including wires, poles, etc., might be constructed by the city, and let to any person or corporation contracting to light the city. By Sec. 4 of the act as amended January 17, 1895, the council was first to pass on the advisability of establishing the public plant. It was then made the duty of the commission, without further approval of the council, to purchase the necessary land and construct a plant. The commissioners were to appoint an electrical engineer, to be known as the City Electrician, and all other superintendents, officers and employees. Before, however, the council ordered the commissioners to proceed to establish the plant, it had to submit the matter to a popular vote, and obtain a majority in favor of it. By Sec. 6 of the act as amended January 17, 1895, the commissioners were to have the general superintendence and management of the plant when erected, and of all the officers and employees engaged in constructing and operating the plant, and were to purchase the fuel, tools, supplies, apparatus, etc., "without further approval or confirmation of their contracts by the common council, provided, however, that the expenditure in no year for operation shall exceed the tax levied that year for that purpose; and provided further, that when the commission shall have approved plans and specifications for buildings, conduits, etc., such work shall be carried out under the immediate supervision or superintendence of the Board of Public Works." This includes the necessary excavation, refilling and repaving. Sec. 7 gave the city the right to raise the necessary funds by taxation, or by loans, payable at such times and in such amounts, and at such rates of interest as the council may determine. The approval, however, of the Board of Estimate was required. Sec. 8 forbids the purchase of land or the buying of property for such plant in excess of the amount raised by taxation or by loans. Sec. 9 gave the commissioners complete supervision over all the inside and outside electric lighting wires in the city, including poles and conduits, whether the same be owned by the city or other parties. The commission was authorized to fix the limits within which all electric lighting wires and conductors must be placed underground. Sec. 10 gave the city full power to make all ordinances in regard to electric lighting and the equipment and apparatus therefor not inconsistent with this act. Sec. 11 provides penalties for interfering with or injuring property under the control of the electric light commissioners. Penalty, $25 to $100, and not to exceed two years' imprisonment; one or both, at the discretion of the court.

Notwithstanding the apparently sweeping powers given to the commissioners by Sec. 4 of the act of 1893, the Supreme Court decided in the case of the Common Council, etc., *vs.* The Public Lighting Commission, 101 Mich., 362, that this act, being an amendment to the city charter, could not by implication revoke the general provisions of the charter for control, and that, therefore, the commissioners must "submit to the common council for its approval or disapproval contracts entered into by the commission under Sec. 4 of the act for the purchase of lands, machinery, and appliances necessary to the equipment of a plant for public lighting." The result of this decision was the act of January 17, 1895, which expressly authorized the commissioners, after the council had ordered them to proceed to erect the plant, to carry out such direction of the council without further approval or confirmation of their contracts by the common council.

At this time the commission was in conflict with Mayor Pingree and the council, and is said to have stolen a march on them by having the amendment of January 17, 1895, put through both houses and signed by the governor in about four hours from the time it was first introduced in the first house.

Under the rules of order of the common council adopted January 9, 1906, the chairman or one-fourth of the members may call for the ayes and noes (Rule 17). Under Rule 25 no ordinance and no resolution or proceeding of the council imposing taxes or assessments shall be passed at the same meeting at which it is first introduced if any member object. It must lie on the table, or be referred without debate to a standing or special committee. When reported, it must be passed by a yea and nay vote of record. By Rule 28, no motion to reconsider is in order after a meeting has intervened. One proposing to make such motion must file notice within 72 hours after the action of the council. As many votes are required to reconsider as to adopt the original motion. By Rule 32, every ordinance must be introduced by the corporation counsel under restrictions of the common council, by a committee of the council to which the matter has been referred, or by a member, upon leave asked and granted. By Rule 35, the corporation counsel, the comptroller, the commissioner of public works, or the designated representative from each of these offices, must attend every session of the council. By Rule 37 every ordinance shall receive three readings in the council, unless otherwise ordered. The first and second may be by title only. The ordinance must be passed by a yea and nay vote. "It shall be in order to amend at any time before the final passage of the ordinance." By Rule 37*a*, adopted June 17, 1902, every ordinance granting, amending, or renewing a franchise for a public utility, after passing the third reading, shall lie on the table 30 days, and if during that time 18 members of the common council, or five per cent. of the voters of the city so petition, it shall be submitted to a popular vote at the next regular election, and if that vote be favorable the ordinance shall be put on its final passage after said vote. Under the rules any ordinance may be amended until it is put on its final passage, but the above rule (37*a*) has been interpreted to mean that a franchise ordinance must lie on the table 30 days in the exact form in which it is to be submitted to the voters if it is to be submitted to the voters at all; that is, after final amendment. By Rule 41, the rules of procedure may be altered or amended to a two-thirds vote of all the members if notice is given at a preceding regular session. The rules may be suspended for a single session by a two-thirds vote of the members present.

A two-thirds vote of all the members elected, under Michigan law, means two-thirds of all the members provided for in the charter, although there be vacancies at the time of the vote. Polasky *vs.* City Clerk, 8 D. L. N. (Mich.), 845; 87 N. W., 1030.

South Norwalk. This matter is entirely regulated by the general statute of [illegible], as amended, acts of 1901, Ch. 156, Sec. 12. The proposal must be passed by a two-thirds vote of the council, and approval by the mayor, in each of two successive municipal years, and afterwards approved by popular vote. It cannot be voted on oftener than once a year. The mayor has the right of veto over this and all other actions of the council. It takes a five-sixths vote by ballot to pass a measure over the mayor's veto.

Under the charter of South Norwalk (private act approved May 28, 1897), all regular appropriations must be advertised in a newspaper not later than the Wednesday preceding the annual meeting—the first Monday of March—at which the appropriations are voted. All special city meetings must be advertised, together with the matters to be acted upon. Any appropriation of more than $1,000 at a special meeting must be made by ballot.

The vote to establish municipal lighting plants must, under the general law, be by ballot. The general municipal lighting act, however (1893), does not permit a municipality to distribute gas or electricity for other than lighting purposes.

The power to distribute electricity for all purposes is granted by special act of May 28, 1897 (City Charter, Secs. 65 and 66). An amendment to the general act of 1893, acts of 1901, Ch. 156, authorizes the manufacture and sale by municipalities of gas and electricity for all purposes. All bonds issued for municipal gas and electric plants under the act of 1893 must be approved by popular vote. Extensions to the works must be approved by popular vote.

B 9. If the municipality is required to pay taxes or fees in regard to its plant to other governmental authorities, explain system.

No such payments in any one of the cities.

B 10. Give statutory provisions regarding purchase of private plants by the city.

Chicago. No special statutory provisions for this purpose.

Detroit. Answered under B 8.

South Norwalk. Under the acts of 1893 the city must buy the private plant if it wishes to sell. The city gives notice to the company of its desire. The company files a schedule and fixes a price. If the parties cannot agree, an appeal is taken to the court, which rules on all questions involved. The city must, at the election of the company, buy both the electric and gas plants in case the company operates and wishes to sell both, even though the plant is located outside the city. In case the city takes the whole plant, it has the right to operate the portions outside the city.

B 11. Give statutory provisions regarding condemnation of private plants by the city under power of eminent domain.

Chicago. There are no special statutory provisions regarding the condemnation of electric plants. As shown above, however, the city has the power to condemn property for general municipal purposes. So far as the operations of the department of electricity are concerned, this power might as well not exist. According to the corporation counsel's office the task of condemning a private plant would be attended with enormous difficulty. The state legislature has never contemplated the possibility that the city might wish to purchase or to condemn any private electric plant. It has been assumed that the city would simply extend its own plant as needed. Consequently, the law is silent on the specific subject of the purchase or condemnation of private electric plants, and in case any such project was broached by the city, the legal complications under an application of the law of eminent domain would probably be so discouraging, according to the corporation counsel's office, that it would be wiser to apply directly to the legislature for further specific power in the premises.

Detroit. There are no special provisions on this subject. The city has the full right to condemn any private property for any public use. So far as I can find out, the Michigan legislature has never authorized the City of Detroit to condemn land already appropriated to a public use for another public use such as electric lighting.

South Norwalk. Under the general act of 1893 the procedure is definitely defined, and must be as explained above. There is no right or occasion for condemnation proceedings. Previous to that act, the City of South Norwalk had the right to condemn property for any lawful purposes. This probably, however, did not include the right to condemn property already devoted to a public use.

B 12. Give statutory provisions regarding the area which may be served by a municipal plant.

Chicago. No such provisions in existence. This permits service to whole city area.

Detroit. The City of Detroit.

South Norwalk. A municipal plant can serve the area of South Norwalk only.

B 13. Give statutory provisions regarding the nature of plant and equipment.

Chicago. No provisions.

Detroit. No provisions except those explained under B 8.

South Norwalk. The municipal plant is managed by three electric light commissioners, as all other plants must be, under the act of 1893. These commissioners make plans and recommendations, including requests for appropriations, to the council. Under the charter, approval of these plans, if the council adopts them, must be obtained by popular vote. This includes appropriations for bond issues if bonds be necessary.

B 14. Give statutory provisions regarding extensions, improvements and new processes.

Chicago. No provisions.

Detroit. No provisions except those explained under B 8.

South Norwalk. No provisions except those explained under B 13.

B 15. Give statutory provisions regarding the price of service, arrangement of charges, discounts, deposits, etc.

Chicago. In lighting the streets mention of price of service does not arise. In selling the surplus current, which the city may do in the near future, prices must be just and reasonable.

The same act, May 18, 1905, which empowered the city to sell its surplus current, also empowered it to prescribe just and reasonable maximum rates for current sold by private companies.

Detroit. There is no price of service, as the plant is forbidden to do commercial lighting. The city, however, does sell a small amount of light and power for the convenience of those who cannot be served by the private company, namely: the Belle Isle Boat club and the Yacht club on Belle Isle at 6c. per K. W., and also the county building and the county jail at 3¾c., and the G. A. R. building, which was built by the city, but is maintained by the G. A. R., at 8c.

South Norwalk. These matters are turned over to a board of three electrical commissioners under the ordinances of September 19, 1892; April 10, 1893; August 1, 1898, and July 7, 1902. This system has prevailed from the establishment of the works. It is also authorized by the general act of 1893. This statute forbids prices to be changed oftener than once in three months, and requires the new prices to take effect on the first day of the month after a month's notice. The prices must not be lower than will return 5 per cent. on the investment and 5 per cent. for depreciation, and must not yield more than 8 per cent. net profit. Gas or electricity furnished for public use must be charged at cost. Deposits may be required and the supply cut off for non-payment. When payment is three months in arrears, appliances may be removed, and not restored until all bills and penalties are paid.

B 16. Give statutory provisions regarding the character and quality of service.

Chicago and *South Norwalk.* No provisions.

Detroit. Left entirely to the discretion of the commission under the general supervision of the council.

B 17. Give statutory provisions regarding the performance of public work by contract or direct labor.

Chicago. There is a statutory provision to the effect that when the value of a piece of work exceeds $500.00 it shall be done by contract and not by direct employment. It was this provision which prevented the city from building the Lawrence avenue intercepting sewer by direct employment, although the city wished to do so. Nevertheless, there seems to be no interference with the city when it does its ordinary construction work in the course of daily routine by day labor. In the Department of Electricity, for instance, there is a great deal of work done by direct employment every year in the way of building conduits, laying or stringing cables or wires, planting poles and installing hoods and lamps. All this work is done by direct employment, although the material is, of course, bought by contract. The same situation exists in other departments where construction work is done. Ordinary routine work is done by day labor, while distinct special jobs of more than $500.00 in value are done by contract. It may be remarked that the law about $500.00 jobs is exceedingly inconvenient at times when an emergency exists and when the city would like to get the work done without delay.

Detroit. Since the amendment of January 17, 1895, the commissioners have entire discretion in this matter, and do work either by direct labor or by public contract. In practice they make all ordinary extensions by direct labor. They doubtless would advertise for contracts if they intended to build buildings or carry on other work of that nature. The above is the interpretation that the lighting commission puts on the amended form, Section 4, of the Act of 1893. The practice of the board has been uniform since the amendment of January 17, 1895 (previous to that they were enjoined from proceeding without the approval of the council). Notwithstanding the amendment of 1895, the law department of the city considers that the public lighting commission and all other boards, officers and commissions of the city, with the exception of the water board, are merely agents of the common council and, as such, subject to the general provisions of the charter. Under this interpretation, the commission would have to make extensions by public competitive contract in all cases where the labor and material cost more than $200.00. The matter has never been judicially determined. The corporation counsel remarked to me that he was quite sure of the law and had no official knowledge that the law, as he interpreted it, was being violated.

South Norwalk. No provisions.

B 18. Give statutory provisions regarding the letting of public contracts.

Chicago. Contracts must be advertised and then must be let to the lowest responsible bidder. In practice, it is always possible to draw the specifications for the contracts in such a way as to place their disposal largely in the hands of the head of the department.

Detroit. Answered under B 17. Section 8 of the Act of 1893 forbids the letting of a contract or the purchasing of property in any year in excess of funds provided for that year, either by tax or by loans. See also question B 30.

South Norwalk. No provisions except that the mayor must execute the contracts authorized by the City Charter of 1897.

B 19. Give statutory provisions regarding the issuance of bonds.

Chicago. See answer to B 7. Further, the City and Village Act, Article 5, Section 1, provides that the city shall have power to borrow money on the credit of the corporation for corporate purposes, and issue bonds therefor, in such amounts and form and on such conditions as it shall prescribe, but shall not become indebted to an amount—including existing indebtedness—to exceed 5 per cent. of the value of the taxable property, to be ascertained by the last assessment.

Detroit. By Section 239 of the charter, the council orders the loan; the mayor and comptroller sign the bonds, which must not be issued in sums less than $500.00 nor sold below par. They must be advertised by the comptroller as ordered by the council, and before delivery to the purchaser must bear certificate of the comptroller that they have been issued in accordance with the law and the charter, and the proceeds, including any premiums and interest accrued before delivery, must be turned into the treasury. The bonds are then delivered to the purchasers by the city treasurer, who receives them from the comptroller. Section 239 limits the gross debt, city water bonds excluded and the amount in the sinking fund deducted, to 2 per cent. of the assessed valuation.

South Norwalk. The plant and extensions may be paid for by bonds (but not other forms of indebtedness) at par; maximum rate, 5 per cent; maximum time, thirty years. Every issue must be approved by popular vote (charter of 1897, also act of 1893; see also answer to B 3).

B 20. Give statutory provisions regarding use of income.

Chicago. No provisions.

Detroit. The enabling statute did not anticipate that there would be any income. The very small income mentioned under B 15 and also a very small amount received from other distributors of electricity for the use of the city's poles and conduits for their wires is turned into the city treasury. By an act approved March 29, 1905, any city income from other sources than taxation may be devoted to any public purpose by a two-thirds vote of the council. By the same section and with a like vote, any surplus may be transferred from one item of an appropriation bill to another item depending upon the same fund.

South Norwalk. No provisions.

B 21. Give statutory provisions regarding depreciation.

Chicago. No provisions.

Detroit. No statutory provisions. It has been the custom of the commissioners to write off 3 per cent. annually for depreciation on the whole plant including lands and buildings, and in recent years in addition to this, to write off the value of discarded machinery. The first commission, which was probably of a higher grade of ability than succeeding ones, undertook to set apart 5 per cent. for depreciation, but before the policy could be carried out the personnel of the commission was changed.

South Norwalk. The price, if commercial lighting be done, as is the case in South Norwalk, must be sufficient to return above cost of operation an amount equal to 5 per cent. on the investment annually for depreciation. (Act of 1893.)

B 22. Give statutory provisions regarding sinking funds.

Chicago. The present constitution of Illinois, Article 9, Section 12, provides that whenever bonds are issued provision shall be made for levying taxes for meeting the interest on such bonds and also for making payment of the principal at the end of twenty years. The City and Village Act, Article 5, Section 1, Paragraph 6, provides for the power to issue bonds in place of, or to supply the means to meet, maturing bonds or for the consolidation or funding of the same. In all cases such bonds are a liability on the city and not on the department of electricity. There is only one case in which any part of any issue of bonds has been used for work in the department of electricity. All other funds for the department have been provided from the ordinary income of the city or from the street railroad funds above mentioned. The case in which part of the bond issue was used was the case of the new H. N. May plant at Fullerton avenue and the river. The city council determined just how the whole issue of bonds should be used on that occasion, as it apportioned part of the issue for specific construction on the work in the department of electricity.

Detroit. The debt of the lighting department is not distinct from the general city debt. By section 260 of the City Charter, the mayor, comptroller, and the treasurer, and the committee on ways and means are made a board of sinking fund commissioners, and are authorized to buy and pay the debt of the city as fast as they can. They are required to report from time to time, and whenever ordered, to the council. By an act of April 6, 1905, the council is authorized to levy each year a sufficient amount to pay the interest and to meet any deficiencies in the interest fund by reason of non-collection or other causes. In regard to the sinking fund, the act provides that in the case of any bonds issued after July 1, 1901, during the life of these bonds, there shall be levied an amount equal to 75 per cent. of the face of the bonds, the levy to be in equal annual installments. Interest accruing on public funds deposited in the bank goes to the sinking fund, but may, if, in the judgment of the sinking fund commissioners, not needed to liquidate the principal of the debt, be transferred to the interest fund. By an ordinance of July 13, 1871, Section 3, the city treasurer must keep deposited with some trust or safe deposit company in the city, to be designated by the council, all the moneys, bonds and securities belonging to the sinking fund commissioners. Such deposit is to be a special deposit in a sealed envelope, properly marked and held subject to the order of the mayor, comptroller and treasurer. By ordinance of September 9, 1901, special provision is made for a sinking fund under these commissioners for paving and sewer bonds.

South Norwalk. The annual appropriation must include that for the sinking fund, if there be any sinking fund (Act of 1893).

B 23. Give statutory provisions regarding auditing of accounts.

Chicago. There is no statutory provision regarding the auditing of accounts of the department of electricity. The current methods leading to auditing are as follows: The department handles no money itself; it simply draws vouchers for the payment of salaries, purchase of material, etc., and passes these vouchers on to the comptroller. On its own books, the department enters the amount of these vouchers against the appropriations made by the city council, so that the department can know at any time just how much money it has left in each appropriation. The City Hall custom has frequently permitted the charging of a certain sum against an appropriation to which it does not belong in case the right appropriation has come to be in danger of exhaustion. In such a case, at the end of the year, it is difficult to say for just what purpose each sum of money has been expended. To go back now to the comptroller, it should be remembered that all the moneys expended in the department pass through his hands. At the end of the fiscal year the finance committee of the city council has the comptroller's books audited by some firm of accountants, and this auditing of the comptroller's books is incidentally an auditing of the books of the department of electricity.

Detroit. The statute provides for no regular audit of the accounts. The comptroller of the city is required to make an annual statement of receipts and expenditures by Section 124 of the charter, and by Sections 253 and 254, he must make such report; and he and the city council both have the power to require detailed reports of receipts and expenses for any past year or part thereof, and of estimates for the ensuing year. There is no provision in either of these sections or in any other that said reports should be published. As a matter of fact, these bald summaries are published in various forms. In practice, although it is not required by any statute, a report of the lighting commission is made monthly to the council, to the mayor, to the city accountant and to the general superintendent of the plant. This apparently is prepared by the secretary. Section 136 gives the council the right to call upon any board or officer for reports and detailed statements at any time in regard to any matter under their control.

South Norwalk. No statutory provisions. In practice, the city auditor audits the accounts.

B 24. Give statutory provisions regarding the publication of reports.

Chicago. The City and Village Act requires the publication of reports annually by the city treasurer and city collector (Article 7, Sections 10 and 14), but there is no statutory provision for the publication of reports by the department of electricity. The City Code, however, in Section 806, provides that the city electrician shall annually, on or before the first day of February, in each year, prepare and present to the city council a report showing the receipts and expenditures and the entire work of his department during the previous fiscal year.

Detroit. Answered under B 23.

South Norwalk. No statutory provisions except that the electrical commissioners must report to the council, whose sittings are public. In practice, since the plant was started, reports in full have been published each year in pamphlet form. A special report of the investigation of the plant was published September 10, 1902. In recent years, at least, annual reports are reprinted also in the general report of the city. The commissioners must report at any time when requested to do so by the board of councilmen.

B 25. Give statutory provisions regarding salaries paid.

Chicago. By statute, salaries and wages of all persons in the department of electricity are in the power of the city council.

Detroit. This matter is left absolutely to the discretion of the commissioners by Section 5, Act of 1893. The commissioners serve without pay.

South Norwalk. No state statutes. Under the ordinance of September 19, 1892, the commissioners were authorized to "operate such plant." Under that provision the commissioners had full charge of this matter until the ordinance of July 7, 1902, giving the commissioners full power to employ, direct and dismiss all employees on the staff and to fix their compensation. The commissioners have always served without pay, although the ordinance of July 7, 1902, states that they "shall receive for their services as commissioners such compensation as the council shall prescribe."

B 26. Give statutory provisions regarding wages to day laborers.

Chicago. No provisions.

Detroit. Left to the discretion of the commissioners, Act of 1893, Section 5. See also answer to B 30.

South Norwalk. No provisions.

B 27. Give statutory provisions regarding the hours of labor of day laborers.

Chicago. An Act of March 5, 1867, provides that eight hours labor, between the rising and setting of the sun, in all mechanical trades, arts and employments, and in other cases of labor by the day, except in farm employments, shall constitute a legal day's work where there is no special contract or agreement to the contrary. This is not to apply to labor by the month, day or week, or to interfere with working overtime. It will be seen that this law does not accomplish very much. The City Code provides as follows (Section 1927): Eight hours labor, between six o'clock A. M. and six o'clock P. M., shall be and constitute a legal day's work for all employees performing manual labor for the city. Provisions of this section shall not be construed to apply to or govern the police or fire department or any department or workshop where constant operation is necessary, provided, however, that in all cases of necessity, superintendents, foremen or others in authority are hereby authorized to work their employees such number of hours as such necessity or emergency may require, but for all labor performed in excess of eight hours in any one day, such laborers or employees shall be entitled to and shall receive pay at the rate of time and one-half for all such labor performed.

Detroit. Left to the discretion of the commissioners by Sec. 5, act of 1893. By the rules of the commission, approved January 22, 1902, Rule 18, persons employed by the day work eight hours, with proportionate pay for overtime. By Rules 19 and 20, persons employed and paid by the month are subject to call at any time of day or night without extra pay for working more than eight hours. The regular hours for operating employees are eight, with three shifts, beginning at eight A. M. Employees in the maintenance and executive departments work from eight to five with an hour for dinner. Trimmers are not required to work after they complete their circuits. See also answer to B 30. These rules were first adopted in the year 1897-8, in a fit of economy, because "the commissioners considered that the plant operated under its enforced conditions should produce an arc light of 2,000 candle power for the year at about $50.00, and heads of departments were instructed accordingly." (Third annual report, Page 4.) This attempt to reduce the cost greatly probably had a deep political significance. It certainly had a pronounced influence on the future history of the plant; at least the two or three years immediately following this order are those in which the plant was most in politics. The average cost, as per report of the commission for 1896, was $64.19; for 1897-8, $51.85. One direct result of this action was to produce a trimmers' strike, which is said to have been promoted by members of the council in the attempt to catch the labor vote.

South Norwalk. No provisions.

B 28. Give statutory provisions regarding pensions for employees.

Chicago. None for the department of electricity. Pensions for employees in the fire and police departments were provided by act of July 1, 1879. Pensions for employees in the water department were provided by act of May 16, 1905. These acts show the tendency toward public pensions.

Detroit, South Norwalk. No provisions.

B 29. Give statutory provisions regarding strikes.

Chicago, South Norwalk. No provisions.

Detroit. Chapter 302 of the Revised Statutes (1897) authorizes the submission to arbitrators of any controversy that might be the subject of a suit at law or in chancery, with exceptions noted in the act; and Chapter 30 of the same edition provides for the establishment of a court of mediation and arbitration. It is doubtful if these acts would apply to a strike in the municipal electric plant, at least the act is not significant in this connection, as it requires the voluntary consent of both parties to the arbitration to make the decision binding. The court of arbitration has simply on its own initiative the right to investigate, the statute not even requiring that the decision should be published.

B 30. Give statutory provisions regarding the citizenship of employees.

Chicago. None. See, however, Schedule II., E 40.

Detroit. The city charter, Section 166, authorizes the council by ordinance to fix a minimum of $1.50 per day for all laborers employed by the city or by contractors or sub-contractors doing work for the city, and requires that all such laborers be residents of Detroit. It also requires that the stipulation on the minimum wage be a part of all contracts of the city. The violation of this provision by any contractor debars him from any further contracts for the city. The council is specifically authorized to make up the deficit below $1.50 to any workman and to deduct the amount from the sum due on the contract. On April 7, 1891, the council passed over the mayor's veto an ordinance fixing the hours of labor at eight per day for city employees and those working on contracts for the city, and apparently passed the ordinance in a revised form, April 11, 1902. Section 2 of the ordinance specifically reserves to the council the right to forfeit a contract for violation of this provision. Section 3 requires the substance of the ordinance to be in all contracts. The council, by ordinance of December 30, 1899, fixed the minimum wage for city employees and those working on city contracts at $1.50 per day, and required the comptroller, upon due notice, to protect such laborers by withholding a sufficient sum from the balance due the contractor.

South Norwalk. No provisions.

B 31. Give statutory provisions regarding other important matters.

Chicago. Electricity being so new a business, there are few statutory provisions which expressly contemplate its relation to the city government. Construction of municipal electric plants was not based on any special grant of power to construct such plants, but simply on the general power to light the streets. In fact, there are only two state laws which specifically mention electricity in its relation to the city government. One of these is the act of 1905 above mentioned conferring the power to sell surplus current and to fix rates charged by private companies; the other is the Frontage Act, which will be considered later under Section D of this report.

Detroit, South Norwalk. No provisions.

B 32. Are the laws relating to the construction and operation of the works applicable to public and private plants alike?

Chicago. Yes.

Detroit. Question hardly applicable. Under the act of 1893, the lighting commission, under the superintendence of the board of public works, is left entirely free to construct and operate electric works. Substantially the same freedom is given the companies under the Revised Statutes (1897), Sections 7132 to 7145.

South Norwalk. Question hardly applicable. Private companies, however, require, by Sections 3445 and 3446 of the Revised General Statutes in force in 1898, the consent of all abutting property owners for the placing of poles and wires, and the approval of the location by the city council or some department other than the electric department, of the city government. In the absence of specific legislative requirements, the board of electrical commissioners assumes that the consent of the property owners is not required, while the exercise of the city's powers of regulation over private companies is, by ordinance of July 7, 1902, delegated to the board of electrical commissioners. The mayor of five years ago evidently felt that the statutes discriminated against the city. In his annual message of January 7, 1901, referring to the electrical department, he said: "The present law under which our plant is operated is complicated and difficult to follow, and there would seem to be no good reason why our charter should not be so amended as to give us the same powers which all private electric companies have."

B 33. If there are any differences, state them.

Chicago. Answered under B 32.

Detroit. ———

South Norwalk. Answered under B 32.

B 34. If any state board, commission or other authority has control or supervision over municipalities as regards electric lighting works, give statutory provisions.

No such provisions for any one of the cities. The different states doubtless have power to pass such legislation, but as yet have not chosen to do so.

B 35. What have been the effects of this supervision?

B 36. Does the municipality make regular reports to state boards or commissions as to results of operation?

B 37. Is there any authority not connected with the municipality itself which tests current and character of service?

B 38. Are the results of such examination published?

B 39. If judicial or administrative orders have been issued by the state authorities relative to municipal electric lighting works, state them.

Chicago, Detroit, South Norwalk. The same answer can be made to all these questions as to B 34. There are no statutory requirements calling for the making or publishing of such reports, and no such judicial or administrative orders have been issued. No such reports are in practice made.

B 40. Has the municipality unrestricted power as regards its own plant; (*a*) to fix rates charged for current; (*b*) to fix rates charged for meters, appliances, etc.; (*c*) to raise money by taxation to defray current expenses?

Chicago. The city has the right to fix just and reasonable prices for its current, and also for meters and appliances. It may raise money by taxation for its plant, so far as street lighting is concerned, but not to provide service to private consumers. Private consumers are to get only the surplus of the current produced for public purposes.

Detroit. Detroit has the unrestricted right to fix rates for current and for meters and appliances, and also to raise money by taxation to defray the current expenses. See also answer to B 15.

South Norwalk. The city is limited by the statute of 1893 as to the rates to be charged for current. The rates for meters and appliances are not specifically mentioned in the statutes, but are virtually restricted by the provisions limiting the profits. There is no restriction on the power of the city to levy taxes for current expenses.

D—FRANCHISES OF PRIVATE COMPANIES.

D 1. Does the municipality have power to grant franchises to electric lighting companies?

Chicago. Yes. There is nothing in the constitution or in any act of the legislature of Illinois which specificallly mentions electric lighting among the objects for which the city can grant franchises. By the City and Village Act, Article 5, Section 1, Paragraph 9, it is provided that the city shall have power to regulate the use of its streets. In Paragraph 11 of the same article and section, it is provided that the city shall have power to provide for lighting the streets. In Paragraph 13 of the same article and section, it is provided that the city shall have power to regulate openings in the streets for laying gas or water mains, for building or repairing sewers, tunnels or drains, and for erecting gas lamps. According to Professor Henry Schofield of the Northwestern University Law School, it is from the general powers conveyed in these paragraphs that the city draws its right to grant franchises to electric light companies.

Detroit. Yes.

South Norwalk. No, although there have been passed general incorporation laws for forming joint stock companies. In practice, these companies generally have special charters, which charters grant the power to do business in the municipalities named without the consent of the local authorities. In fact, under the present corporation law, all public service corporations require special charters (Sections 3554, edition of 1902, and Corporation Act of 1901, Chapter 157, Section 2). These special charters uniformly give the right to enter the territory without the consent of the local authorities. The local authorities are limited to the regulation and control as described in Sections 3904 and 3905. In the case of companies using electric wires or conductors for any purpose (Revised Statutes in force in 1898, Section 3945), no company in the state can exercise its powers or change the location of its wires without the consent of the adjoining proprietors, and in case such consent cannot be obtained, the county commissioners, after due notice to the proprietors and a public hearing, may give such consent; and by Section 3946 (same edition) the local authorities "have full direction and control over the placing, erection and maintenance of any such wires, conductors, etc., including the relocating or removal of same, and including the power to designate the particular kind, quality and finish thereof, and may make all orders necessary to the exercise of such powers of direction and control." The company has the right to appeal to the Superior court, which deals with the order according to its discretion. By Section 3906, Revision of 1902, any judge of the Superior court may make any proper order in regard to any matter referred to in Section 3904, Revision of 1902 (Section 3945, Revision of 1898), and may review the decision of the county commissioners.

D 2. How was this power conferred?

Chicago. The City and Village Act was a general act for the incorporation of cities and villages, passed in 1872. It became applicable to the City of Chicago when it was adopted by the city in 1875.

Detroit. The laws of Michigan are decidedly vague on this subject. I understand that the City of Detroit grants franchises under the following language (Chapter 7, Section 170, of its charter), describing the powers of the council: "Also to control, prescribe and regulate the manner in which the highways, streets, avenues, lanes, alleys and public grounds and spaces within the said city shall be used and enjoyed." The lighting act of 1893 specifically authorizes the city to contract with any person or company for the public lighting. Perhaps the necessary implication here is the right of granting a franchise to a company with which to contract. It is probable also that under the general electric light act (Chapter 131, Revised Statutes, 1897, Section 7141), originally passed April 1, 1881, the city by implication is given the right—if not required—to grant electric franchises. This section declares that a company organized under the general act "shall have full power to produce, generate, furnish and sell such electricity and electric light as may be desired in any city, town or village where such corporation carries on its business, for lighting public or private buildings, streets or grounds, and for any other purposes, and such corporation shall have power to lay, construct and maintain conductors for conducting electricity through the streets, lands and squares of any such city, town or village with the consent of the authorities thereof, under such reasonable regulations as they may prescribe; and such corporation may make all such contracts and by-laws as may be deemed necessary and proper to carry into effect the foregoing powers." The corporation is given specific power to acquire and hold such real and personal property as shall be necessary for carrying on its business. As throwing some light on the general statute of 1881, the following quotation from the Supreme court, Putnam *vs.* Grand Rapids, 58 Michigan, 421, may be of interest. The court, in dealing with an earlier special statute (the charter of Grand Rapids), said: "If there is any power to employ electric lighting—and there can be no doubt of this—especially in view of the subsequent statute of 1881, which expressly requires cities to allow that light to be introduced, and permits its use for public lighting—then it must be received in conformity with its nature, which, so far as least, requires the power which supplies electricity to be transmitted to many lights from one or more central stations as gas is furnished. The statute contemplates that the companies may do this, and that cities may prefer it to erecting their own works. It would require a much larger inferential power under this charter to establish their own supply than to avail themselves of the supply at hand. No city could be administered upon the merely expressed powers of its charter without the aid of some implications." The court proceeds immediately to cite the vague powers under which Detroit provides for its public lighting (Charter, Chapter 7, Section 117). This case was decided in 1885, and cites immediately on this point the case of the Attorney-General *vs.* The City of Detroit, 55 Michigan, 181.

South Norwalk. Answered under D 1.

D 3. State fully, step by step, the procedure which must be followed and the requirements which must be met in the initiation, consideration, enactment and renewal of franchises; also source of each provision, whether statute, city charter, or ordinance.

Chicago. These things are left entirely to the city council, except that those provisions which apply to the passage of all ordinances apply likewise to the passage of ordinances granting electric light franchises.

Detroit. The granting and renewal of franchises takes the form of an ordinance, and is subject to the procedure under the rules of the council and the city charter, as explained under question B 8. The charter, Section 156, requires that all meetings of the council shall be public, that the complete journal of the proceedings shall be printed (Section 153), that the proceedings or any part thereof may be published in the official paper (Sec. 151). All ordinances must be published for three successive days in the official paper. This may be changed by ordinance, but not to exclude one publication. The council may order ordinances published in other than the English language. It is customary to publish the ordinance in full in the journal before it is put on third reading. It is probable that the pending street car franchise ordinance is as important a one as has ever been introduced in the Detroit council. This was under consideration while I was in Detroit, and doubtless illustrates well the method of dealing in practice with franchise grants. (See Detroit Free Press, September 12, 1906.) This was reported to the council by a committee, with various amendments, on September 11, read twice by its title, ordered printed in the proceedings, and laid on the table for one week. The report of the committee states that the ordinance had been presented by the mayor, that it had been approved by the corporation counsel, and included various amendments as a substitute "for the ordinance presented at a session held on July 31 last." The committee recommended that the ordinance be passed by the council and submitted to a popular vote at the November election. I am informed by the city clerk that it has uniformly been the custom for the last four years to order all ordinances printed in the journal the night they are introduced.

There is no general ordinance to this effect, but the order to print is contained in the motion to refer.

South Norwalk. Largely answered under D 1. Under the city charter (special act of May 28, 1897), the city council has the right to provide for the public lighting of the city's streets. The method of making such a contract (not a franchise) for the public lighting is for the council to authorize the corporation counsel and the mayor to negotiate it, report it to the council, and the council then refers it to a city meeting of all voters. This is not technically required, but is virtually incumbent on the council, in as much as the annual appropriations, including everything that can be foreseen, must be referred to and approved by the annual city meeting. This matter is fixed by statute, and requires public notice of appropriations and other business to be transacted. Extra appropriations, if more than $1,000, must by the charter, Section 27, be approved by a city meeting by ballot. Smaller extra appropriations not exceeding in any one case more than $1,000, may be made by a two-thirds vote of all members of the council, after a specific advertisement of the proposition to make the appropriation has been given for at least five days.

D 4. Give legal provisions, with source of each, defining the powers of the city regarding the alienation of municipal franchises.

Chicago. The council has power to prohibit alienation under its general power to annex conditions. This point seems clear, but in case an ordinance granting a franchise is silent on the subject, there is a question as to whether or not alienation is possible. There has been no test case in Illinois. The United States Supreme court, however, has held that in the absence of a prohibition to the contrary, a franchise is alienable, unless it be a franchise from the state empowering the grantee to be a corporation.

Detroit. I am not sure what this question means. The word "franchise" does not appear in the city charter. There is no reference in the charter to such an important matter as street railways, except a brief section authorizing the city to agree with the company now occupying any street for the removal of the tracks from that street on the condition that the city will not permit any other company to use the same street. In regard to gas, the charter authorizes the appointment of a commission, which is given power to construct and operate gas works. The act of April 22, 1875, had to be first accepted by popular vote. There is no other reference to gas or gas companies in the charter.

The state laws permit telegraph and telephone companies to occupy the streets and public places of cities without the consent of public authorities, which, under these laws, have merely the right of reasonable regulation. Telegraph and telephones are not mentioned in the city charter.

Under the general power given to the council "to control, prescribe and regulate the manner in which the highways, streets, avenues, lanes, alleys and public grounds and places within said city shall be used and enjoyed," the city grants franchises to electric companies. In some of the instances it fixes the term of thirty years (the life of the corporation under the constitution, Art. 15, Sec. 10). In other cases no mention is made of the term. Where the term is not mentioned the courts have uniformly held that the street franchises lasted to the end of the corporate life of the company (Wyandotte Electric Co. *vs.* City of Wyandotte, 124 Mich., 43); and have also held that such a franchise when accepted by the company is a contract. The occasion of companies asking for a franchise is that they are usually organized under the general electric lighting legislation (Revised Statutes, 1897, Sections 7131-7145). These acts forbid the companies to exercise their corporate powers without the consent of the local authorities, who may subject the companies to such reasonable regulation as they may prescribe—original lighting act, Sec. 10 (1881). Sec. 159 of the city charter provides that the council "shall have the general management and control of the finances and all the property, real, personal and mixed, belonging to the corporation, whether lying within or beyond the limits of said city, with full power to sell, convey, transfer and dispose of the same absolutely, and shall have power to make all necessary regulations for preserving and protecting the same from destruction, decay, or injury, and concerning the management thereof."

It is doubtful if, under Michigan jurisprudence, this would permit the alienation of a municipal franchise (71 Mich., 95, Attorney General *vs.* City of Detroit). The clause certainly would not permit the granting of an exclusive franchise.

South Norwalk. Sec. 1 of the city charter declares the city capable of purchasing, holding and conveying in fee simple or otherwise any and all property, real or personal. Sec. 32 requires that all grants and leases of real estate belonging to the city become effective when authorized by the council, signed by the mayor, and sealed with the city seal. So large a part of the government of South Norwalk is carried on by the city meeting, corresponding to the old town meeting, that the courts of Connecticut are unusually liberal in interpreting the powers of cities. It would scarcely be an exaggeration to say that the city of South Norwalk, through action of its city council and mayor, approved by city meeting, can legally do anything that is not specifically prohibited by statute. In practice the city council refers all important matters to city meetings, whether required by statute so to do or not. It is very sure that the city council would not assume the right to alienate a franchise without a popular vote, but would consider it legal to do so if supported by a vote of the city meeting. It is a well established principle in Connecticut law that the city meeting, and not the city council, is the chief governing body. Even the legislature has a profound respect for a city meeting, and has in recent years made general revisions of the city charters and the more important legislation affecting the city subject to the popular referendum.

It is interesting in this connection that, whereas the city charter of 1882 was not to be effective without the approval of the mayor and board of councilmen, the charter of 1897 required approval by popular vote.

It was under a similar broad interpretation of like powers given in the earlier charter that the public electric lighting plant was established in 1891 and 1892. The legality of this action was never passed on by the courts. In this instance the action was validated by later legislation (city charter, May 28, 1897, Sec. 65), and the necessity for a legal interpretation for other instances was removed by the general public ownership or municipal lighting act of 1893.

B 5. Give legal provisions, with source of each, defining the powers of the city regarding the methods of disposing of franchises.

Chicago. Answered under D 9.

Detroit. Answered under D 3.

South Norwalk. Answered under D 4.

D 6. What are the legal provisions, with source of each, delimiting the powers of the city as to insertion of clauses in franchises regarding streets to be utilized by company?

Chicago. Answered under D 9.

Detroit. Bearing in mind the fact that electric lighting companies get their franchises directly from the state, and are subject merely to the consent of the local authorities and to reasonable regulation, and that exclusive electric lighting franchises are not permitted under the general electric laws of Michigan, and comparing the street railway legislation with the electric lighting legislation; while the city can prevent any company from operating in that city, it has no express authority to fix terms and conditions of construction or operation to a greater extent than amounts to "reasonable regulation," as is the case in the street railways. For the provision on street railways, see Revised Statutes (1897), Sec. 6425.

In the face of such vague language relating to the control of the streets and providing for the public lighting, the courts have repeatedly held that where a company asks for and accepts a franchise, that franchise becomes a contract, binding on the two parties, and that virtually anything can be put into such a contract that is not in specific language, or by necessary implication, prohibited in the charter of one of the two contracting parties. On the contrary, in Taylor *vs.* Bay City Street Railway Co., 80 Mich., 77, in which Bay City authorized a street railway company to lay tracks without compensating adjoining property owners, and the legislature later amended the city charter so that the city might grant locations provided the company compensated the adjoining property owners. The court held the later amendment to the city charter legal on the ground that the earlier grant to the company to lay tracks without compensation was not specifically authorized in the earlier city charter. This decision does not seem to me in harmony with the general trend of Michigan decisions. It is extremely difficult to define the attitude of the Supreme court of Michigan on the powers of cities to contract; that is, to fix terms and conditions in a franchise. While on the one hand that court has never formally departed from the general rule that municipalities are bodies with delegated power, and can, therefore, exercise such powers only as are expressly granted, or as are necessarily implied to enable the municipality to carry out powers expressly provided, it has gone a long way in practice to abrogate this rule by permitting municipalities to make and carry out all such contracts as are not expressly prohibited by statute or constitutional provision, or are not plainly repugnant to public policy. The vagueness existing in this regard so far as electric lighting is concerned, is intensified by the fact that virtually all the powers are implied powers, and by the further fact that in this industry, at least, Michigan municipalities have been wonderfully conservative in acting under such implied powers. For example, no one of the five electric franchises in Detroit makes mention of any definite term of years. In fact, these franchises contain nothing outside of plain police regulations, and some peculiar safeguards for enforcing the same, except a provision against consolidation of companies and other devices tending toward monopoly. I have personally some doubts as to the legality of this anti-monopolistic clause for the violation of which the franchises are to be voided. I believe that, if a suit could be maintained under this clause, the statute makes adequate provision to deal with the evil apart from this clause. The court has said time and again that if such a contract, in whole or in part, is *ultra vires* of one or both corporations, either party, having voluntarily entered into the contract, is itself estopped from questioning the legality of the contract, and that such a question can be raised by the attorney general only, in the name of the state, unless personal or property rights of individuals are invaded or affected (see 85 Mich., 646). A similar ruling has been had in the case of the corporation whose charter permitted it to do business in the city without a franchise, but which, in fact, obtained a franchise, which it formally accepted. Michigan Telephone Co. *vs.* City of Benton Harbor, 121 Mich., 512; Wyandotte Electric Light Co. *vs.* City of Wyandotte, 124 Mich., 43; also Detroit Street Railway Co. *vs.* Mills and Britemeyer, 85 Mich., 634.

In the Wyandotte case above cited it was also held that where no period is specified in the franchise ordinance (as is the case in all five electric ordinances in Detroit), the law would assume that the contract ordinance is for the full period of the life of the corporation. This period is fixed by the constitution at 30 years, with power in the legislature to extend for periods of 30 years by general legislation. Under the general statutes, a corporation has power by corporate action to renew its own existence for an additional period of thirty years (Ovid Elevator Co. *vs.* Secretary of

State, 90 Mich., 466). The courts of Michigan have never ruled on the right of a corporation at the end of thirty years to extend its existence for another thirty years as over against the city. I have found no case in Michigan of a franchise attempting to provide by its terms for a renewal of the franchise contract at the end of the first thirty years. None of the electric light companies in Michigan have existed for thirty years, while the legislature in regard to gas companies whose charters have expired, has obviated the difficulty of the franchise problem for such companies by specific legislative provision. The best legal advice that I could get is that a company that renews its corporate existence must seek a formal renewal of its franchise rights in the streets.

As throwing some light on the almost unlimited right of the city to contract in these matters, the court remarks in Traverse City Gas Co. *vs.* Traverse City, 130 Mich., 22 (1902): "The law contemplates that permission will not be unreasonably refused or unreasonably burdened, but regards the municipality as competent to determine the proper conditions for this." Although this is a gas case, the law is exactly the same in this particular as for electric companies. This is a case in which the company agreed to lay its pipes in the alleys wherever ordered to do so by the council and then refused to lay pipes in certain alleys because of the inconvenience and greatly added expense. The court upheld the city, although the court found that laying the pipes in the alleys would deprive the company of all profits for two and one-half years, and said: "If the contention of the relator is to prevail, the attempts of common councils in granting like franchises to safeguard the interests of the city or village for which it is (they are) acting will prove abortive, and when the franchise is once granted the control of the city or village over the street is lost."

South Norwalk. These matters are regulated entirely in the special charters of the companies or of the city. Usually the city has no power in this connection, but in case of friction between the company and the city, each runs to the legislature and presents numerous bills to hamper the other party. For instance, the Connecticut Railway and Lighting Company, the successor to the Norwalk and South Norwalk Electric Lighting Company, bought an additional railway system some years ago, and wished to build a connecting link under the Washington street bridge between the two parts of the system. At the same time it was testing the right of the city to establish its electrical plant, and sueing the city for breach of contract for the public lighting of the city. The city stole a march on the company, and procured a special amendment to the charter of the companies, under which no track could be laid under the Washington street bridge and in some other portions of the city, or certain portions of track be made double track without the consent of the city, given after a public hearing. The act applied not only to the existing rights of the company, but to privileges asked for and pending petitions (Act of June 25, 1895).

Under this act it took the company from September 25, 1901, to May 1, 1903, with hearings, rehearings, engineer's reports, special city meetings, etc., to obtain permits to lay tracks under the Washington street bridge. At the meeting at which the location was granted (May 1, 1903) Engineer Mansfield reported that the company was running two sizes of cars; that the white cars required a clear heading of 12 ft. 6 in., and the Jumbo cars (apparently not one of the cars in operation, but a proposed new car) would require 12 ft. 7 in. The meeting granted a clear space of 12 ft. 2 in. I was unable to determine the exact effect of this grant, and do not know whether it was later modified. The company had almost as great difficulty in obtaining other permits under the same act.

The fight under such a system vibrates back and forth from the city council and city meeting to the state legislature. One who bids fair in these matters to obtain a victory in the courts is often compelled to withdraw his suits and forego that pleasure in order to check hostile legislation, and vice versa. Suits are sometimes entered to check hostile movements in the legislature. For instance, under date of May 11, 1901, a multitude of suits entered between February, 1893 and May 14, 1901, involving virtually every controversy that had arisen between the city and the lighting companies, no important suit having been pressed to a conclusion, were by mutual consent dropped, and the company, at whose initiative the suits were dropped, agreed not to contest further the right of the city to furnish commercial electric light and power, provided the city would drop certain hostile bills then pending in the legislature. This contract to drop the suits, dated April 17, 1901, is that under which the city is, in fact, if not legally, permitted to furnish commercial light and power without conforming to the general act of 1893. The company under this agreement released all claims and demands of every sort against the city, and the city agreed to let the lighting company, which also owns the street railways, lay its tracks under the Washington street bridge, although, as indicated above, it was not until May 1, 1903, that the company was able to get its definite location under the bridge. The agreement simply called for letting the company go under the Washington and Monroe street bridges, "on such terms and conditions as the council of said city may deem to be to the best interests of the public." This agreement was signed on behalf of the company by its counsel, and on behalf of the city by the mayor and every member of the council. On February 14, 1902, the city councils referred the bill of Fessenden and Carter, special counsel in these cases, to the annual city meeting. The bill was for $5,500 for services and $139.60 for disbursements; total, $5,639.60. Some idea of the complexity and extent of this litigation can be gathered from the fact that the itemized bill specified 142 days between February, 1893, and May 14, 1901, in which appearances had been made in court. This bill was paid in full, and the amount has since been carried as an asset of the electric department, which liquidated the cost from its earnings.

D 7. Ditto regarding nature of plant and equipment?

Chicago. Answered Under D 9.

Detroit. Answered under D 6.

South Norwalk. Not within the province of the city. Determined entirely by the charters of the companies.

D 8. Ditto regarding construction of extensions?

Chicago. Answered under D 9.

Detroit. Answered under D 6.

South Norwalk. Answered under D 7.

D 9. Ditto regarding adoption of improvements and new processes?

Chicago. All these matters are left to the city council. Under its general power to regulate streets and openings in the streets the city council, even in the absence of specific provision in the franchise ordinance, exercises a supervision over the street operations of lighting companies. This power over the streets is exercised through the commissioner of public works, although the city electrician is charged with the particular responsibility with respect to the installation of electrical apparatus.

Detroit. Answered under D 6.

South Norwalk. Answered under D 7.

D 10. Ditto regarding duration of grants?

Chicago. Under the constitution of Illinois, "no *ex post facto* law, or law impairing the obligation of contracts, or making any irrevocable grant of special privileges or immunities shall be passed." This prevents the passage of any perpetual electric lighting franchises. Otherwise, in the case of electric lighting companies, there is no time delimitation. For a generation street railway grants have been limited to twenty years by general statute.

Detroit. Answered under D 6.

South Norwalk. Answered under D 7.

D 11. Ditto regarding forfeiture of franchises?

Chicago. Left to council.

Detroit. Answered under D 6.

South Norwalk. It is usually provided in the charter that a certain amount of work must be done in a certain period, under penalty of forfeiture. These provisions are, in fact, unimportant in themselves, and could be enforced by judicial proceeding only, at the instigation of the state.

D 12. Ditto regarding time, method, and terms of acquisition of plant by city?

Chicago. Left to council.

Detroit. Entirely covered by the act of 1893, as amended in 1895; and under this act may be made the subject of franchise contract, as explained under D 6.

South Norwalk. Under the general act of 1893, amended by Ch. 156, Sec. 12 of an act of 1901, a city may establish public lighting works, gas or electricity, by a two-thirds vote of the council, approved by the mayor, in each of two successive municipal years. The act requires that the city shall purchase the plant of existing companies if the companies wish to sell; and if a company operates both gas and electricity, both shall be bought. Although but a portion of the plant may be desired by the city, it must purchase all, both within and without the city, at the option of the company. Appeal on this point goes to the Superior Court. In case the city purchases part of a plant outside the city, it may operate it on the same terms as the company operated it. If the company wishes to sell under this act, it must within thirty days after the final vote of the city make a detailed schedule of property with prices attached. If the price is not mutually acceptable, either party may carry the case to the courts. The court appoints a commission, which, after public hearing, determines the property to be sold and the price. Either party may file with the court within fourteen days a remonstrance against the finding of the commission. After hearing the remonstrance, the court may set aside the finding in whole or in part, in which case the court appoints a new commission. The right of remonstrance is a continuing one. When the court is satisfied and issues a decree, the decree is appealable to the Supreme Court of Errors. If the Supreme court reverses the decision of the Superior court, the case is remanded to be tried *de novo*, and is again subject to remonstrance, confirmation and appeal. The price shall be the fair market value for the purposes of its use; no portion, however, to be put in at less than the value for other uses. The earning capacity is to be included. Rights and privileges acquired by the company with the intention of using them must be included. Incumbrances are to be subtracted from the value, and the city may, with the approval of the court, require the property to be turned over free of incumbrances. The city shall not be compelled to pay for patent rights unless it is permitted to exercise those rights at as low a price and to as full an extent as the company.

D 13. Ditto regarding disposal of plant thus acquired?

Chicago. Left to council.

Detroit. The city has full power to operate under the act of 1893.

South Norwalk. This matter is not mentioned in the general legislation, and is covered by the answer to D 1.

D 14. Ditto regarding consent of abutting property owners to use of streets?

Chicago. According to the frontage act of 1897, "the city council shall have no power to pass an ordinance granting to any person or corporation the right or privilege to lay in or on the ground or string any wire on, over, or by which electricity for lighting purposes is to be used, distributed, or conveyed in any street, except upon petition of owners of land representing more than one-half of the frontage on said street, or on so much of it as is sought to be used." However, it may be added that the important electric lighting franchises in the City of Chicago were granted before the passage of this act.

Detroit. No consent required.

South Norwalk. Under the revised statutes in force in 1898, Sec. 3945, any company distributing or using electricity must have the consent of adjoining proprietors; but in so much as, subject to this provision, the local authorities have full control and regulation of these matters, municipalities have always assumed that they did not require such consent of property owners for their own wires and poles. The matter has never been presented to the court for adjudication. By the laws of 1893, Ch. 237, any person or corporation is forbidden to manufacture and sell electricity outside of their own premises in any municipality of over 15,000 population without the consent of the General Assembly.

By ordinance of July 7, 1902, the Board of Electrical Commissioners of South Norwalk is authorized to exercise the control and regulation vested in the city over the electric plants, apparatus, etc., of private companies.

D 15. Ditto regarding period within which construction had to be begun?

Chicago. Left to council.

Detroit. This matter may be made the subject of contract, as explained under D 6.

South Norwalk. The provisions are different in the different private charters, now all absorbed by the Connecticut Railway and Lighting Company. The Gas Supply Company, chartered July 2, 1895, authorized to operate in ten towns and cities in Fairfield county, was to forfeit its rights in any town in which it did not lay one mile of pipe and distribute gas in four years. This charter was absorbed into the Connecticut Lighting and Power Company May 2, 1899, with the right to furnish both gas and electricity in any town in the state by vote of the stockholders, and was to forfeit its rights in any particular town if it had not, within four years, laid one mile of pipe, wire, or conduit, and was not ready to distribute gas or electricity; but it was to be saved from this forfeit provided that within four years it purchased any part of the stock or bonds of any other gas or electric company in any such town, consolidated with such company, or leased or purchased the plant of such company.

D 16. Ditto regarding period within which plant had to be completed?

Chicago. Left to council.

Detroit. Answered under D 15.

South Norwalk. Answered under D 15.

D 17. Ditto regarding monopoly rights, or competitive plants furnishing the same or competing services?

Chicago. Left to council.

Detroit. The legislature, under the Michigan constitution, may grant the power to a city to enter into a contract with a company giving it an exclusive franchise, but so far as I can find out no such grant has been made to any municipality—certainly not to Detroit. (Grand Rapids Electric Light and Power company *vs.* Grand Rapids E. E. L. and F. G. Co. *et al.*, 33 Fed. Rep., 659.)

South Norwalk. As previously explained, there are no exclusive privileges in South Norwalk, and everything except the municipal plant has been absorbed into the Connecticut Railway and Lighting Company.

D 18. Ditto regarding rates to be charged?

Chicago. By the act of May 18, 1905, the state legislature conferred upon the city the right to fix maximum rates for electrical current furnished by franchise holding companies.

Detroit. This matter has never been directly ruled upon in Michigan as regards electric rates. It seems doubtful to me if the Michigan courts would permit Detroit, under the vaguely expressed powers to contract on any subject, to grant away, by franchise contract, rights which the United States courts uniformly declare to be governmental rights of which the public authorities cannot divest themselves by contract. Certainly such a grant, if authorized at all, would be construed most strictly. See Pingree *vs.* The M. R. Railway, 118 Mich., 314; also, Detroit City Street Railway Company *vs.* Detroit, 184 U. S., 368. The whole question is decidedly an open one in Michigan.

South Norwalk. Under the Connecticut system, this matter would be regulated by the company's charter, if at all. There is no mention of the prices to be charged in any of the charters of companies operating in South Norwalk.

D 19. Ditto regarding character and quality of service?

Chicago. Left to council.

Detroit. A proper subject of contract under the implied powers of the city.

South Norwalk. Answered under D 18.

D 20. Ditto regarding the right of the city to regulate operation?

Chicago. The right of the city in this respect is not abridged by any state legislation.

Detroit. A proper subject of franchise contract under the implied powers of the city so far as contract provisions are not against public policy.

South Norwalk. Answered under D 18.

D 21. Ditto regarding taxation?

Chicago. The tangible property of an electric lighting company is taxed in just the same way as the property of any other company or person is taxed. The value of the franchise comes in for additional taxation. The State Board of Equalization is charged with the duty of determining the fair cash value of the capital stock of the company, including its franchise, over and above the assessed value of its tangible property. When the stock of the company is taxed in this way, it is not to be taxed in the ordinary way as personal property. The company is to certify the value of its stock to the assessor. The assessor is to certify it to the county clerk; the county clerk is to certify it to the state auditor, and the state auditor is to certify it to the State Board of Equalization.

Detroit. The legislature has not granted Detroit the right to exempt a company operating under a franchise in Detroit from taxation. It is plain from the ruling in The Citizens Street Railway Company *vs.* The Common Council, 125 Mich., 702, that the legislature might grant such power. On this point see also The City of Detroit *vs.* The Detroit City Railway, 76 Mich., 421. In accordance with the ruling in Water Supply Co. *vs.* City of Ludington, 119 Mich., 480, it is plain the City of Detroit, under its present powers, might contract, not to exempt a company from taxation, but to hold such a company harmless or compensate it for taxes paid the City of Detroit.

South Norwalk. Taxation is regulated entirely by state statute. The city under its charter (1897), Sec. 28, is granted but a single kind of tax, the general property tax, which must be levied at the annual city meeting, and to which there is no statutory limitation. The rate for the last year was seven mills, general purposes, and one-fourth mill for library. The city makes its own assessment through two assessors appointed annually by the council. It equalizes these assessments through a board of relief of two members, also appointed annually by the council, with the right of appeal from this board to the court. The city, however, is a part of the Town of Norwalk. The town, through its own assessors, assesses all the property in the town, including that in South Norwalk, and equalizes the same through its own Board of Equalization. The town rate last year applying to the property in the City of South Norwalk was 7½ mills. There are three school districts in the Town of Norwalk, each levying its own rate on the basis of the town assessment. These rates last year were three, two, and one and four-tenths mills respectively. The town assessments are further equalized by the State Board. All railroad property, including street railway property, is exempt from local taxation. It is assessed and taxed directly by the state for the benefit of the state, since the act of 1864. By the act of June 2, 1897, no bill or resolution affecting private interests may be introduced into the legislature until a fee of $5 is paid. The fee is returned if the bill or resolution is not passed. If it is passed, and provides for capital stock, an additional fee of $1 per $1,000 of capital stock permitted shall be paid the state treasury; but this fee shall in no case be less than $50. (Revised Statutes, 1902, Sec. 3316.) A like fee shall be paid for any additional issues permitted by amendments.

The companies seem to think they have a grievance because the city assessors in recent years have listed the poles, wires and gas pipes separately in their valuation. There is an intimation that in doing this the city is compelling payment for the right to establish these items of property. I could find no evidence to justify such an insinuation. It is true that the assessors assess these items as property and attach a value to them, but I found no evidence that they attach an artificial or excessive value to them as property.

Within the Town of Norwalk the Connecticut Railway and Lighting Company is subject—apart from its railroad property, which is taxed entirely by the state—to seven distinct local rates, namely: Three school districts, with respective rates for the year 1905-6 of 2, 1¼ and 3 mills; library, City of South Norwalk, ¼ mill; general city tax, City of South Norwalk, 7 mills; City of Norwalk, 8 mills; Town of Norwalk, 7½ mills. Total tax paid under these seven rates, $2,809.56.

D 22. Ditto regarding compensation for franchises, including free services?

Chicago. Left to city council.

Detroit. This point has never been adjudicated. On the principles already enunciated under various questions, it is probable that the matters referred to under this head, and all the other matters referred to in questions D 22 to D 32, inclusive, might be made the subject of franchise contract.

It is possible, however, that the court might rule against the matter referred to under D 25 (on the issue of stock and bonds) on the ground that the company was thereby restricting its power to fulfill its public duty. Certainly, if such matters should be covered by contract, either of the contracting parties would be estopped from raising the question of power (85 Mich., 646).

South Norwalk. The city has no power in this matter, and nothing in the charters of the companies operating in South Norwalk requires compensation or free services.

D 23. Ditto regarding paving of streets?

Chicago. Left to council.

Detroit. Answered under D 22.

South Norwalk. It is generally provided in the charters that streets, when opened, shall be restored to their former condition. Under the provision in the city charter (act of May 28, 1897, Sec. 22), giving the city power to regulate the laying of gas pipes, water pipes and drains; and under Sec. 3946, Revised Statutes in force in 1898, giving the city the right of control over the apparatus for using or distributing electricity, the city, by ordinance of October 7, 1899, requires permits for opening the streets or other public places, and a guarantee—either a deposit or bond—that the street will be restored to its former condition (ordinance of

September 8, 1902, and minutes of city council, February 1, 1901, authorizing a bond, instead of a deposit for each opening).

Under the general act of June 1, 1893, relating to street railways, to which all street railways, however and whenever chartered, are subject, cities are given much wider power over the locating and relocating, and removing tracks, etc., than the city has over other kinds of companies. The statute specifically requires the railroad company to keep the space between the tracks and for two feet on each side in repair to the satisfaction of the local authorities. No tracks can be laid until locations are granted by the local authorities, who have the right to relocate the tracks by repealing the locations, but such repeal is subject to judicial determination.

Under an act of 1895 (Ch. 283), street railway companies were forbidden to exercise their powers until locations had been approved and granted by the local authorities. The railroad companies had a right "to appeal" from the order of the local authorities, or in case the local authorities refused to act at all on their petition. The appeal goes to the Superior court. On July 13, 1897, the Supreme court, in a very remarkable decision, declared this provision unconstitutional because it conferred legislative power on the judiciary (see 69 Connecticut, 576). By Sec. 5, Ch. 156, acts of 1901, the legislature attempted to circumvent this decision of the Supreme court by making the action, or the refusal to act, of the local authorities in granting locations appealable to the State Railroad commission, and the action of the commission thereon appealable to the Superior court. Each of these appeal bodies is given power to amend, alter, or revoke the action of the previous body. As a layman, I cannot see how the more recent legislation avoids the difficulty found by the Supreme court in the case cited above. It seems to me that it has left the difficulty untouched, and simply added an additional cog to the machinery for appeal to a court, which, by the decision above, never had any jurisdiction. Other sections of the Revised Statutes of 1902 involved in this question are: Secs. 3832, 3833, 3834 and 3747.

D 24. Ditto regarding removal of mains from the streets?

Chicago. Left to city council.

Detroit. Answered under D 22.

South Norwalk. The charter of the gas company permits the laying of gas mains, and gives the city no authority, save to see that the streets are restored to good order. The general legislation on the use and distribution of electricity (Secs. 3945 and 3946, Revision in force in 1898; also see ordinance of July 7, 1902, and the agreement of October 5, 1903, for the use of joint poles by the city, the Connecticut Railway and Lighting Company and the Southern New England Telephone Company) gives the city a rather complete power over the locating and relocating of poles and wires. This power does not, however, extend to the general right of having the poles and wires removed from the streets so long as the company wishes to do business. The right of the city to order poles and wires removed was one of the matters in litigation for so many years after the public electric lighting plant was established, the city having ordered such removal on April 10, 1893, and the company having brought suit April 22, 1893, to restrain the city from such action. This was one of the many suits compromised in the grand settlement of 1901.

D 25. Ditto regarding issuance of stocks and bonds?

Chicago. This matter is governed only by the general incorporation act. That act prescribes the formalities which must attend incorporation. It places practically no check on the issuance of stock and bonds.

Detroit. Answered under D 22.

South Norwalk. Under the special charter of the Connecticut Lighting and Power Company (May 2, 1899), Sec. 5, amended and name changed to the Connecticut Railway and Lighting Company, special act of April 30, 1901, there seems to be no limit to the issue of stock or bonds provided they be for any purpose authorized by this act. The nominal share capital outstanding March 1, 1906, common and preferred, was $15,000,000; of bonds, partially issued by subsidiary companies, and excluding amount in the treasury and in sinking fund, $12,719,190.59. It is doubtful, however, if under Connecticut law the cities can insert clauses in a franchise grant covering this point.

D 26. Ditto regarding examination of records?
D 27. Ditto regarding audit of accounts?
D 28. Ditto regarding publication of reports?
D 29. Ditto regarding returns to public authorities?
D 30. Ditto regarding transfer of franchise to third party?

Chicago. All these matters are left to the city council. For D 30, see answer also to D 4.

Detroit. All these questions are answered under D 22.

South Norwalk. The city has absolutely no rights regarding the matters covered by these questions.

D 31. Ditto regarding labor clauses?

Chicago. The city can adopt any regulations it pleases with regard to the handling of its own labor. The city, however, cannot bind private companies in such a way as to violate the provisions of the constitution of Illinois with regard to the obligation of contracts. A union labor clause, for instance, would be unconstitutional.

Detroit. Answered under D 22.

South Norwalk. Answered under D 26.

D 32. Ditto regarding other important matters, including renewal of franchises?

Chicago. The right of a city to revoke a franchise is a moot point. Certainly the city cannot revoke a franchise at its own will or pleasure. The grounds of revocation are reviewable by the courts. The city, if it pleases, may waive its right to forfeit a franchise or license when the company has failed to perform the acts required by the terms of such franchise or license (73 Ill., 541).

Many electric franchises in territory now included within the city limits were granted by Boards of Trustees in towns and villages which, at the time of the grant, were without the city limits. Under recent court decisions it seems likely that these grants have ceased to be operative.

Detroit. See answer to D 22 and to D 6. It is probable that the conditions of the renewal of franchises may be made the subject of contract, provided that the period of the renewal does not extend beyond the life of the corporation. Whether or not any provisions looking beyond that period would hold has not been adjudicated, but is very doubtful.

South Norwalk. See answer to D 26.

D 33. What remedies, penalties and means of enforcing the above provisions (D 6-32) have been provided?

Chicago. The statutes of Illinois are silent on this point, with the possible exception of the frontage act, in which act it is provided that a property owner may enjoin a lighting company from laying its wires in a street in which the frontage consents have not been secured in accordance with the law. In all other matters the provision of remedies and penalties is left to the city. The city has been extremely negligent in dealing with this matter. There seems to be no city official particularly charged with the duty of requiring obedience to the provisions of the electrical franchise ordinances. It might be presumed that the city electrician, at the head of the department of electricity, was the proper official to discharge such duties, and it is true that in the department of electricity there is a bureau of electrical inspection. The head of this bureau supervises the installation of all electrical apparatus, in many cases charging fees therefor. It seems, however, that in practice his duties end with the supervision of installations. The commissioner of public works, through his subordinate, the superintendent of streets, supervises the street operations of the companies. There can be little doubt that at the present time the City of Chicago knows very little about the tangible property or the financial operations of the electric lighting companies. The difficulty even of collating the franchises themselves is enormous. They are scattered through the special ordinances and the council proceedings. There is no one place in which they are brought together. Detailed plats of street work have been furnished to the department of public works by the companies, and have then been lost, or so filed as to render their subsequent discovery impossible. A city, however, which has such inadequate plats of its own street work can hardly be expected to retain much recollection of street work performed by the companies. The conclusion of the whole matter is that the City Hall affords exceedingly imperfect facilities for studying the electric lighting companies of Chicago.

Most ordinances provide that under certain circumstances the franchises shall be forfeited. Owing to imperfect supervision, however, a franchise might have been forfeited for many years before the city became aware of the fact.

With regard to the opening of streets, it is the custom to provide that the company must make a deposit, or otherwise financially assure the city that the streets will be restored to their former condition.

Whatever forfeiture conditions have been prescribed by the city will be found in the answers to questions further on in this schedule (in answers to questions D 36-57).

Detroit. None of the matters referred to under the franchises of private companies (D 4-32 inclusive), have been made the subject of franchise contract between the lighting companies and the city, except that referred to in D 11; that is, the forfeiture of franchises, which see.

Sec. 9 of the public lighting act of 1893 gives the public lighting commission complete supervision over all the electric lighting wires, whether public or private, and forbids the establishment of any lines for lighting "except under such general regulations as they (the commissioners) from time to time may adopt." The commissioners are authorized to prescribe the limits or districts within which all wires must be put underground. The following section (10) gives the city council the power by ordinance to regulate the use of overhead wires and poles, and in this particular thereby makes the commission subject to the power of the council.

The history of these clauses is very peculiar. The council has from time to time ordered the private companies to put certain wires underground. On July 28, 1896, the council passed an elaborate ordinance to be carried out by the electric lighting commissioners by inspectors authorized by the ordinance. It is possible that this ordinance might be construed to apply to the outside or street wires, but as the ordinance fixes no scale of charges for inspecting outdoor wires, and as it does contain an elaborate scale of charges for inspecting indoor wiring, and as no specific appropriation has ever been made for the inspection of street wires, the commission has never attempted to enfore any inspection of wiring other than that in buildings, except such as will enable the city to collect the pole and conduit rentals from the private companies where such companies use the poles and conduits of the city. On September 11, 1906, I attended a meeting of the commissioners, at which they went over the report of the coroner's inquest on the body of a man killed by the current of the Edison company, which current was carried by poles used jointly by that company and the city. It came out very clearly that the commission had never exercised the power of control or inspection of the private outdoor wires, and never intended to do so until it could get a special appropriation for that purpose. Under the ordinance of 1896 three inspectors are now regularly employed in inspecting the wiring of buildings. At the meeting of September 11 a sub-committee of the commission was appointed, consisting of the two engineers on the commission and one other member, to investigate and report on the whole subject of the rights, powers and duties of the commission in regard to the control and inspection of the wires, poles and other property, and the operation of the private electric companies. An ordinance was passed on November 1, 1898, authorizing the commission to examine and license wiremen. Apparently this was to apply to those wiring buildings only. The ordinance also contains some provisions looking toward safety in regard to placing any other wires too near and on the same poles with wires with high potential energy. If such wires were on the same poles, they were required to be eight feet apart. It was made the special duty of the commissioners (by Sec. 5) to investigate all complaints of exposed or dangerous wires, making it a penal offence for anybody to disobey the orders of the commission issued on such occasions. These latter provisions plainly apply not only to indoor lighting and outdoor lighting, but also to wires used by others than electric light companies. I cannot find that the commissioners have ever acted specifically under this ordinance. They have conducted the inspection of the wiring of buildings under the ordinance of 1896, which gives the commission an income from this source from fees for inspection. The ordinance of 1898 provides for no fees or other source of income to the commission.

An ordinance of December 3, 1900, makes a curious provision whereby the electric lighting commission is authorized to grant revocable permits, not only to electric lighting companies, but to any person or corporation, for establishing conductors, wires, conduits, etc., in the whole or any part of the city. The ordinance is rather an elaborate one, providing for police regulations and methods of enforcing the same, reserving to the council the right, at discretion, to revoke any such permits at any time, and to require all poles and wires to be removed at the expense of the licensee. It also authorized the commission to require joint use of such poles, and, in general, to exercise a supervision over their placing and use. I cannot find that the public lighting commission has ever acted under this ordinance, except to arrange for the joint use of poles.

However, the general lighting ordinance of October 17, 1893, contains provisions very similar to those of the ordinance of 1900, so far as licensing persons to establish conductors for electricity is concerned, but licenses or franchises, under the ordinance, require a bond of $20,000 to bind the licensee to obey this ordinance, and also require a deposit of $200 as a guarantee of putting the pavements, etc., in good condition. In addition, Sec. 8 requires the payment annually of $1 per pole, and of $5 per mile for each single wire. All such permits are revocable by the council, which may order the poles and wires removed at the expense of the licensee. It can readily be seen that the uncertain tenure given by this ordinance, coupled with the financial burdens placed on the licensee by it, must prevent any general competition with the Edison Illuminating Company. I am under the impression that more than one permit has been granted under this ordinance, but I cannot find that any company except the East Side one (see answer to question A 16) ever began operations under it. The rights of this company were soon bought up by the Edison company.

South Norwalk. As will be seen by the totality of the previous answers, these matters are determined directly by the state legislature, with the exception of the fact that cities are given some power over street railway tracks; but even such powers remain undetermined judicially, and ineffective practically, because when a difference of opinion arises, the controversy is not determined locally or judicially, but the fight becomes political, and is transferred to the state capital, and takes the form of each party trying to get special legislation favorable to itself, or adverse to the other, or both.

D 34. Are they effective?

Chicago. See answer to D 33.

Detroit. See answer to D 33.

South Norwalk. The system of constant appeal to the legislature seems to me defective in theory and demoralizing in practice.

D 35. If defective in any regard and the provisions are not enforced, state in what respects, and give reasons.

Chicago. The city electrician has too many duties to be able to devote any real part of his time to the supervision of private companies, and, as stated above, there seems to be no official to whom this duty of supervision is specifically assigned. It is very difficult, therefore, to know whether or not the electric lighting companies of Chicago are obeying the terms of their franchises. There is no recollection of any pains or penalties inflicted upon an electric lighting company for failure to comply with its obligations, except in the case of a few small plants whose franchises have lapsed because of a failure to continue in business the length of time stipulated in their forfeiture clauses. It may be that all the electric companies are obeying their ordinances in every detail. The City Hall has few facilities for making any discoveries to the contrary.

The question of the regulation of the consolidation of companies is considered under Question A 16.

Detroit. ———

South Norwalk. The general police powers over the companies have been pretty thoroughly enforced for the reason that those in charge of the city government have had a powerful influence in the state legislature. So long as this is the case, it behooves any company that does not wish to be injured by special legislation to conform to the will and desires of the city government.

D 36. Give complete list of all electric lighting franchises now in force in the following form:

(1) Name, (2) date of issue, (3) by what authority granted, (4) duration, (5) exclusive or competitive, (6) approximate mileage of streets granted to company.

Chicago. D 36-57. These questions will be found treated in the exhibit hereto attached (made a part of the subsequent portions of this report). Forty-five franchises are mentioned in detail. Two others are mentioned which have expired. Twenty-seven of the forty-five franchises have been granted by the City of Chicago. The rest have been granted by towns or villages since annexed. Under recent court decisions, it seems likely that these latter franchises have ceased to be operative.

Of the nineteen franchises granted by towns and villages since annexed, seven were granted by the Town of Lake, six by Hyde Park, three by Lake View, and one each by Fernwood, Norwood Park and Washington Heights.

It will be noticed that there has been a constant improvement, generally speaking, in the safeguards thrown about the granting of electric lighting franchises.

Few of the franchises granted by the City of Chicago have covered any very extensive part of the city.

The general history of the companies owning the franchises, and the present situation, are considered under Question A 16.

All franchises contain provisions guarding the city against injury to street paving. These provisions are either a penal bond, or the deposit of a sum sufficient to cover the cost of repairs. The typical form only is given, at the end of the accompanying schedule-tabulation.

Provisions of All Unexpired Franchises Granted by the City Council of Chicago and the Village Boards of Annexed Territories.

(N. B.—There may be some franchises not included in this list, but a search for them through the scattered records of the city would not be profitable. All ordinances of importance will be found in the following pages.)

Headings as far as D 57 (for Chicago) are the same as those in the printed schedule. Added heads are self-explanatory.

Where no mention of a provision is made, this is indicated thus, ..., except in the case of "property owners' consent" (D 40), where, in the absence of special provision, "No" is written.

A cross (x) before a provision indicates a "joker."

"Town of Lake" is six by six miles in the southwest part of Chicago.

"Hyde Park" is almost a triangle between Town of Lake and Lake Michigan. The western line is about twelve miles long, the southern about six, and the eastern line, the hypothenuse of the triangle, is formed by the lake shore.

"Lake View" means a section on the extreme northeast about 5 by 2 miles.

Hyde Park, Town of Lake, Lake View and other outlying portions were annexed to Chicago in 1889. Later "Washington Heights" and "Fernwood," small villages to the southwest of the city, were also annexed. All these are therefore now included in Chicago, as well as Norwood Park, another small suburb lying northwest of the city.

Name.	*Date.*	*Authority.*	*Duration.*	*Competition.*	*Mileage.*
American Gas Engine Electric Co.	1895	Chicago Council....	20 years.	Competition.	1 block each way.
Auburn Park Electric Light, Power, Heat & R. R. Co	1891	Village Board, Fernwood	....	......	Total village.
Otto V. Bachelle................	1892	City Council.......	20 years.	Competition.	Center to Ogden in Madison, ½ mile.
Chicago Sectional Electric Underground Co	1882	City Council.......	25 years.	Competition.	Whole city.
Citizens' Electric Lighting and Power Co..................	1888	Village Board, Hyde Park	....	......	Hyde Park, south of 95 and east of Lake Calumet, except Pullman. About 5 by 2½ m.
John L. Cochran.................	1887	Board, Lake View..	25 years.	Competition.	Cochran's Subdivision, small patch in Lake View.
Consumers' Electric Light Co.....	1888	City Council.......	20 years.	Competition.	4 blocks.
Co-operative Electric Light Co....	1888	City Council.......	....	Competition.	About 400 miles.
Garfield Electric Light Co........	1897	City Council.......	25 years.	Competition.	Old Twelfth Ward.
Lake Electric Lighting Co........	1886	Trustees, Town of Lake	....	......	Whole Town of Lake.
Butler Lowry	1893	Trustees, Norwood Park	....	......	Norwood Park.
Robt. C. Miller..................	1897	City Council.......	20 years.	Competition.	Few blocks on northwest side.
Mutual Electric Light and Power Co.	1894	City Council.......	20 years.	......	State Street to west limits and Thirty-ninth to south limits. S. W. quarter of the city.
People's Electric Light & Motor Power Co....................	1889	Board of Trustees, Town of Lake....	....	......	Town of Lake.
People's Light & Power Co.......	1888	Board of Hyde Park	....	......	Hyde Park.
Fred R. Persons.................	1890	Washington Heights Board	....	Exclusive...	Washington Heights; very small patch.
John B. Sherman................	1889	Board of Town of Lake	....	......	Town of Lake.

Name.	*Date.*	*Authority.*	*Duration.*	*Competition.*	*Mileage.*
Sparr & Weiss..................	1894	City Council.......	Expired.	......	....
Suburban Electric Light & Power Co.	1896	City Council.......	30 years.	......	Milwaukee Avenue and Carpenter Road; small triangle.
Sun Electric Light Co............	1888	City Council.......	20 years.	Competitive.	Adams to Twenty-third, the Lake to River, 2 by 1¼ miles.
Chicago Edison Co...............	1888	Trustees, Town of Lake	....	Competitive.	Whole Town of Lake.
Commonwealth Electric Co.......	1897	City Council.......	50 years.	Competitive.	Whole city.
Western Edison Light Co.........	1887	City Council.......	25 years.	Competitive.	Whole city.
Englewood Electric Light Co.....	....	Boards of Town of Lake and of Hyde Park	....	......	Town of Lake and Hyde Park.
Fort Wayne Jenny Electric Light Co.	1884	Board of Trustees, Town of Lake....	....	......	Whole of Town of Lake.
Hartwig & Ahlswede.............	1888	City Council.......	....	Competitive.	Certain section of northwest side; about a few blocks.
Hyde Park Electric Light & Power Co.	1889	Board of Trustees, Hyde Park......	....	......	All Hyde Park.
Hyde Park Thomson-Houston Co.	1889	Board of Trustees, Hyde Park......	....	......	All Hyde Park.
Lake View Electric Light Co.....	1887	L. V. Board........	25 years.	Competitive.	About 1 by 2½ miles.
Town of Lake Electric Light Co..	1884	Board of Trustees, Town of Lake....	....	......	Whole Town of Lake.
Western Electric Co.............	1886	Board of Hyde Park	25 years.	......	South Chicago, southern end of Hyde Park.
Western Light & Power Co.......	1889	Board of Lake View	....	......	Whole of Lake View.
Charles Yondorf	1895	City Council.......	10 years.	Expired.....	Blue Island Avenue; a few blocks.

Name.	*Date.*	*Authority.*	*Duration.*	*Competition.*	*Mileage.*
Herman Grossman & Co..........	1897	City Council.......	20 years.	......	About 1 block in State and Adams Streets.
Cosmopolitan Electric Co.........	1895	City Council.......	50 years.	Competitive.	Whole city.
C. W. Jackson..................	1899	City Council.......	20 years.	......	Few blocks of alleyway in State Street, between Van Buren and Jackson, etc.
Monroe Electric Co..............	1902	City Council.......	10 years.	......	About 100 feet of sidewalk space in Market Street.
Galena Trust & Safety Vault Co..	1902	City Council.......	10 years.	......	One-half block in Monroe Street.
Montgomery Ward	1902	City Council.......	10 years.	......	2 alleys, 1 block in length, down town.
J. H. Kedzie.....................	1901	City Council.......	10 years.	......	About 100 feet in Randolph Street.
A. F. Dexter.....................	1900	City Council.......	5 years.	Expired.....	Around 1 block, State, Quincy,etc.
Dearborn Power Co..............	1903	City Council.......	10 years.	......	50 feet each side in Dearborn, near Monroe.
C. F. Gunther....................	1903	City Council.......	10 years.	......	A few hundred feet in State and Adams Streets.
Chicago University	1904	City Council.......	10 years.	......	About 100 feet in Madison Street, near Fifth Ave.
City Illuminating Co.............	1904	City Council.......	30 months.	......	About 100 feet in Fifth Avenue, near Randolph.
Gerts-Arnold Electric Co.........	1905	City Council.......	10 years.	......	Few blocks Northwest.
Inter-Ocean Newspaper Co.......	1905	City Council.......	10 years.	......	1 block, Dearborn and Madison.

(D 36 continued.) *Detroit.* A—Edison Illuminating Co.; date, July 30, 1886, amended November 19, 1889; granted by City of Detroit; duration not mentioned, but for life of company, thirty years; competitive; approximate mileage of streets granted to the company, the whole city.

B—Peninsular Electric Light Co., formerly Brush Electric Light Co.; date, March 18, 1882; granted by the city; duration, not mentioned, but for life of the company, thirty years; competitive, for the whole city.

(Note A and B.) Both these franchises are now owned by the Edison Illuminating Company. I think it not impossible, as explained elsewhere, that some of the minor franchises also owned by the Edison company are still alive. See answer to A 16.

South Norwalk. As will be gathered from the foregoing report, there are no city franchises in the sense in which that phrase is used in the schedule. The charters, including the street rights, are granted by special legislation. The Connecticut Railway and Lighting Company has, under specific authorization of the legislature (special acts of May 2, 1899, and April 30, 1901) absorbed all of the franchises previously granted to the street railway companies, electric light companies and gas companies operating in South Norwalk. The charter of this company is unlimited in time, is not exclusive, and authorizes the company to operate anywhere in the state by vote of its directors. The only competition that this company has in South Norwalk is that of the publicly-owned municipal electric plant. This plant furnishes electric light, heat and motive power, and a slight amount of steam heating.

D 37. Following the designation used in the preceding question, state for each franchise the conditions upon which franchises may be declared forfeited.

D 38. In like manner, state for each the time, method and terms of acquisition by city.

D 39. In like manner, state for each the method by which plant thus acquired may be utilized.

Chicago.

Name.	*Forfeiture.* 37	*Acquired by City.* 38	*How Utilized.* 39
American Gas Engine Electric Co..	....	....	......
Auburn Park Electric Light, Power, Heat & R. R. Co...........	....	....	......
Otto V. Bachelle..................	Violation subject to repeal..	....	......
Chicago Sectional Electric Underground Co	Subject to repeal on non-payment of compensation.....	....	......
Citizens' Electric Lighting & Power Co.	....	....	......
John L. Cochran..................	....	....	......
Consumers' Electric Light Co......	Any violation of this ordinance causes repeal.......	....	......
Co-operative Electric Light Co.....	Violations cause repeal......	....	......
Garfield Electric Light Co..........	....	....	......
Lake Electric Lighting Co.........	Must complete in two years..	....	......
Butler Lowry.....................	Must give bond and keep plant running............	....	......
Robt. C. Miller.....................	....	....	......
Mutual Electric Light & Power Co..	Any violation city ordinance forfeits (see also D 55)....	....	......
People's Electric Light & Power Co.	....	....	......
People's Light & Power Co.........	....	....	......
Fred R. Persons..................	....	To be bought after three years at arbitrated price.	Street lighting.
John B. Sherman.................	....	....	......
Suburban Electric Light & Power Co.	....	To be bought at end of thirty years at appraised value	......
Sun Electric Light Co............	Any violation city ordinance (see also D 55)...........	....	......
Chicago Edison Co................	Bond filed in sixty days or forfeit	....	......
Commonwealth Electric Co........	....	Buy by appraisal, end of fifty years.............	......
Western Edison Light Co..........	Construction begin sixty days or forfeit................	....	......
Englewood Electric Light Co.......	....	....	......

Name.	*Forfeiture.* 37	*Acquired by City.* 38	*How Utilized.* 39
Fort Wayne Jenny Electric Light Co.	....	....	......
Hartwig & Ahlswede	Violation of ordinance, forfeiture	....	......
Hyde Park Electric Light & Power Co.	(See D 55)	....	......
Hyde Park Thomson-Houston Co.	Plant must be in operation in two years	....	......
Lake View Electric Light Co.	Must begin in ninety days	....	......
Town of Lake Electric Light Co.	Must be done in two years	....	......
Western Electric Co.	Violation of ordinance	....	......
Western Light & Power Co.	If no current is supplied for four consecutive weeks	....	......
Herman Grossman & Co.	....	....	......
Cosmopolitan Electric Co.	....	At end of fifty years city may buy at agreed price.	......
C. W. Jackson	Failure to complete in six months and operate five years; or filing false statement	City to acquire at any time on appraised valuation.	......
Monroe Electric Co.	....	....	......
Galena Trust & Safety Vault Co.	....	....	......
Montgomery Ward	....	....	......
J. H. Kedzie	Failure to pay compensation; foreclosure on property; or transfer this franchise	City to acquire at any time at appraised price	......
Dearborn Power Co.	....	City to acquire at any time on sixty days' notice	......
C. F. Gunther	Failure to operate for a period of four months	....	......
University of Chicago	Failure to operate for a continuous period of six months	....	......
City Illuminating Co.	Failure to pay compensation for sixty days	....	......
Gerts-Arnold Electric Co.	Failure to pay compensation or to operate for sixty days.	City to acquire at any time at agreed price	......
Inter-Ocean Newspaper	Failure to pay compensation or to operate for sixty days.	City to acquire at any time at agreed price	......

(D 37, 38 and 39 continued.) *Detroit.* (37) A and B. According to Sec. 4 of the Edison company's ordinance (there are exactly similar provisions in all the other five ordinances), the franchise is to be forfeited in case the company enters into a consolidation or combination with any other company to control rates or to divide territory, or sells or transfers its franchise to any other person or corporation.

South Norwalk. (37) Under the general statute of 1845 (in revision of 1902, Sec. 3313), all acts creating or authorizing the organization of corporations are subject to alteration, amendment, or repeal by the general assembly unless there is an express reservation to the contrary in the act of incorporation. With this exception, the rights of this company cannot be forfeited save by judicial process upon the initiative of the state for the abuse of its corporate privileges. There seems to be no special exemption in the charter of this company from the right of the legislature to alter, amend and repeal.

Detroit. (38) No provisions.

South Norwalk. (38) There is no right of acquisition, except as regards gas and electricity. Under the general act of 1893, as amended by Ch. 156, acts of 1901, and as amended by the South Norwalk city charter, May 28, 1897, it is probable that the city could purchase the lighting portion of the plant and equipment of the Connecticut Railway and Lighting Company so far as it is necessary for use in South Norwalk. The time has gone by, however, when the statute of 1897 anticipated such a possible sale. The city certainly has no desire to purchase, and never will have for business reasons. It will be recalled that the municipal electric plant was established without specific statutory authority, and that the plant was validated by the city charter of 1897. This charter anticipated that the city, upon undertaking commercial electric lighting, would purchase the private company at a price fixed by judicial procedure. Apparently for political reasons, the company has neglected during these nine years to compel the city to purchase under the charter and the act of 1893. Whatever the reason may have been, the private company has meantime, under authority of the legislature, been absorbed into the Connecticut Railway and Lighting Company, and the gas company has met the same fate. The Connecticut Railway and Lighting Company, with the right to operate throughout the state, does a much wider business in kind as well as in territory than is contemplated for the city under the acts of 1893, 1897 and 1901. As far as electricity is concerned, for obvious reasons the company competes with the city and consequently does in South Norwalk a comparatively insignificant amount of electric lighting. Nor could it separate the portion of its plant used for this purpose from that used for lighting in the adjoining municipalities, and that used for operating its great system of interurban electric roads. It is probable that should the city undertake to establish a municipal gas plant, it would be compelled to purchase the gas plant of the private company under the act of 1893. However, this statute specifically requires that if a company operates both a gas and an electric plant, the city, upon purchasing either, shall be compelled to purchase both at the option of the company. The impossibility of acting under this statute will be seen from the fact that the statute specifically requires the city to purchase the whole plant at the election of the owners, although the city desires but a part of it. This matter is specifically appealable to the court. It is evidently impossible for the city of South Norwalk, covered by the entanglement of companies and industries combined in the Connecticut Railway and Lighting Company, to establish a municipal gas plant against the will of the company so long as the compulsory purchase clause remains in its present form.

Detroit. (39) Under the act of 1893, the city has full power to buy and operate any plant for public lighting only. The city has no power to do commercial lighting.

South Norwalk. (39) The municipal lighting statute (1893, amended 1901) authorizes the municipality through commisioners, and under the various restrictions of this act, to operate all of the property within and without the city which it is authorized to acquire.

D 40. In like manner, state for each whether consent of abutting property owners was required before pipes could be laid.

D 41. In like manner, state for each the period within which construction had to be begun.

D 42. In like manner, state for each the period within which the plant had to be completed.

D 43. In like manner, state for each the provisions regarding the rates to be charged.

Chicago.

Name.	*Front Consent.* 40	*When Begin.* 41	*When End.* 42	*Rates.* 43
American Gas Engine Electric Co.	No.	......	......	Not more than 8 mills per hour for 16 c. p. incandescent.
Auburn Park Electric Light, Power, Heat & R. R. Co.	No.	......	1 year.	Not to exceed 1c. per hour per 16 c. p. incandescent.
Otto V. Bachelle	No.	......	......	Subject to ordinance and agreement.
Chicago Sectional Electric Underground Co.	For use of sidewalks.	6 mos.	......	....
Citizens' Electric Lighting & Power Co.	No.	......	......	30c. per night per 1,200 c. p. arc, burning not more than 12 hrs., etc., 30c. per foot for feeder pipes.
John L. Cochran	No.	1 year.	......	1c. per hr. for 16 c. p.; 50c. for 12 hrs. arc.
Consumers' Electric Light Co.	For use space under sidewalks.	......	......	City Council to control rates.
Co-operative Electric Light Co.	No.	......	......	City Council to control.
Garfield Electric Light Co.	No.	......	3 years.	¾c. 16 c. p. per hour; 35c. per arc per night.
Lake Electric Lighting Co.	No.	......	2 years.	....
Butler Lowry	No.	......	......	1c. per 16 c. p. hour. Street lighting 5c. each 32 c. p. and 6c. each 50 c. p. per night.
Rob't C. Miller	No.	......	......	....
Mutual Electric Light & Power Co.	No.	......	......	1 c. per 16 c. p. hour. Equals $10.50 per month, full service arcs.
People's Electric Light & Motor Power Co.	No.	......	......	50c. standard arc night; incandescent, $12 per light per year; 300 nights to a year.
People's Light & Power Co.	No.	......	......	1c. per 16 c. p. hour.
Fred R. Persons	No.	......	60 days.	Not less than $75 per year per arc (for street lighting).
John B. Sherman	No.	1 year.	......	....
Suburban Electric Light & Power Co.	No.	......	3 years.	1c. per 16 c. p. hour; $10.50 per month per full service arc.
Sun Electric Light Co.	No.	......	......	To be fixed by Council.

Name.	Front Consent. 40	When Begin. 41	When End. 42	Rates. 43
Chicago Edison Co.	No.	......	1 year.	1c. per 16 c. p. hour.
Commonwealth Electric Co.	No.	......	3 years.	1c. per 16 c. p. hour; $10.50 per month per 1,600 c. p. arc all night; 40c. per h. p.; otherwise, reasonable.
Western Edison Light Co.	No.	60 days.	......	....
Englewood Electric Light Co.	No.	......	......	Not more than 1c. per 16 c. p. hour.
Fort Wayne Jenny Electric Light Co.	No.	......	......	....
Hartwig & Ahlswede	No.	......	......	City Council to regulate.
Hyde Park Electric Light & Power Co.	No.	......	1 year.	1c. per hour per 16 c. p. lamp.
Hyde Park Thomson-Houston Co.	No.	......	2 years.	1c. per hour per 16 c. p. lamp.
Lake View Electric Light Co.	No.	90 days.	......	50c. per arc per 12 hours; 12c. per incandescent, 12 hours.
Town of Lake Electric Light Co.	No.	......	2 years.	....
Western Electric Co.	No.	......	......	....
Western Light & Power Co.	No.	......	1 year.	For 2,000 c. p. arc, 50c. per night; 16 c. p. incandescent, 1c. per hour; to city, ½c. per hour, or $160 per year per 2,000 c. p. arc.
Herman Grossman & Co.	No.	......	......	This is a small private plant.
Cosmopolitan Electric Co.	No.	......	3 years.	1c. per hour per 16 c. p. incandescent; $10.50 per month per 1,600 c. p. arc.
C. W. Jackson	No.	......	6 mos.	Amended, 1903, city to regulate prices.
Monroe Electric Co.	No.	......	......	....
Galena Trust & Safety Vault Co.	No.	......	......	No discrimination to be made.
Montgomery Ward	No.	......	......	Private; maximum rate 10c. per k. w. hour.
J. H. Kedzie	No.	......	......	....
Dearborn Power Co.	No.	......	6 mos.	No discrimination; maximum 10c. per k. w. hour.
C. F. Gunther	No.	......	6 mos.	....
University of Chicago	No.	......	......	....
City Illuminating Co.	No.	......	......	....
Gerts-Arnold Electric Co.	No.	......	......	No discrimination in prices.
Inter-Ocean Newspaper	No.	......	......	No discrimination in prices.

Detroit. (D 40.) No; A and B.

(D 41 and 42.) No provisions.

(D 43.) The subject of prices, public and private, not mentioned in any of the ordinances.

South Norwalk. (D 40.) Question diverse. The consent of property owners at no time required for gas pipes. Under the revised statutes in force in 1898, Secs. 3945 and 3946, the consent of property owners is required for establishing poles, wires and other conveyors of electricity, or for relocating the same, or if the consent cannot be obtained, the consent of two of the county commissioners must be obtained after a public hearing. About 1898 the city refused a permit to the South Norwalk Electric Light Company to re-set one of its pole lines with larger poles in order to change its system from the two to the three-wire system. The Supreme court compelled the city by mandamus to grant the desired permission. The case turned on rather technical points, chiefly the claim of the city that the company, before applying for permission, had to obtain the consent of abutting property owners. The court held that the *previous* consent of the property owners was not required. The other point emphasized by the city; that is, that the poles did not belong to this company, but to the telegraph company, was not considered germane to this litigation.

D 41 and 42 are answered under D 15.

D 43. There are no provisions as to rates.

D 44. In like manner, state for each the provisions regarding:

(*a*) Character of service.

(*b*) Voltage and amperage of current.

(*c*) Direct and alternating current.

(*d*) Location of wires.

(*e*) Other elements of service.

Chicago.

Name.	*Service.* 44a	*Voltage Ampere.* 44b	*D. C. or A. C.* 44c	*Wires.* 44d	*Other.* 44e
American Gas Engine Electric Co.	....	....	....	Underground in iron or steel conduits	"Subject to ordinance."
Auburn Park Electric Light, Heat, Power & R. R. Co.	....	....	....	Aerial or underground	Not more than 3 feet wide underground conduits, 1 side street.
Otto V. Bachelle	....	....	....	Underground ...	Subject to supervision Commissioner of Public Works.
Chicago Sectional Electric Underground Co.	....	....	....	Underground ...	Proper insulation.
Citizens' Electric Lighting & Power Co.	....	....	....	(X) Underground at will of Board, except in certain alleys....	Proper insulation; ditches not more than 2 feet wide.
John L. Cochran	....	....	....	Aerial	Subject to further action of Board.
Consumers' Electric Light Co.	....	....	....	Underground ...	File plats with Commissioner of Public Works.
Co-operative Electric Light Co.	....	....	....	Underground ...	File plats with Commissioner of Public Works.
Garfield Electric Light Co.	....	....	....	Underground ...	Subject to supervision head City Telegraph.
Lake Electric Lighting Co.	....	....	....	....	....
Butler Lowry	....	....	....	....	....
Robt. C. Miller	....	....	....	....	Subject to ordinances.
Mutual Electric Light & Power Co.	....	....	....	Aerial and underground	All operation and maintenance subject to direction City Council.
People's Electric Light & Motor Power Co.	....	....	....	....	....
People's Light & Power Co.	....	....	....	....	....
Fred. R. Persons	Lighting streets.	....	....	....	....

Name.	*Service.* 44a	*Voltage Ampere.* 44b	*D.C. or A.C.* 44c	*Wires.* 44d	*Other.* 44e
John B. Sherman	....	....	....	Underground ...	....
Suburban Electric Light & Power Co.	....	....	....	Aerial	After ten years, City Council may make any change and underground wires.
Sun Electric Light Co.	....	....	....	Underground ...	....
Chicago Edison Co.	....	....	....	Subject to ordinance	Subject to ordinance.
Commonwealth Electric Co.	....	....	....	See D 61........	File plats with Commissioner of Public Works.
Western Edison Light Co.	....	....	....	Underground ...	....
Englewood Electric Light Co.	....	....	....	Aerial or underground	....
Fort Wayne Jenny Electric Light Co.	....	....	....	Aerial	....
Hartwig & Ahlswede	....	....	....	Underground ...	Permits from Commissioner of Public Works required.
Hyde Park Electric Light & Power Co.	....	....	....	Aerial or underground	No wires less than 20 feet above street.
Hyde Park Thomson-Houston Co.	....	....	....	Aerial or underground	To spend $10,000 on plant within one year.
Lake View Electric Light Co.	....	....	....	Aerial or underground	Subject to inspection.
Town of Lake Electric Light Co.	....	....	....	....	Subject to ordinances in general, except see D 50.
Western Electric Co.	....	....	....	To be strung in alleys	....
Western Light & Power Co.	....	....	....	Aerial or underground	....
Herman Grossman & Co.	....	....	....	Underground ...	....

Name.	*Service.* 44a	*Voltage Ampere.* 44b	*D. C. or A. C.* 44c	*Wires.* 44d	*Other.* 44e
Cosmopolitan Electric Co	....	....	....	Aerial, except in a section in centre of city where must be underground. but to bring wires to surface every 4 blocks	Subject to general supervision Commissioner of Public Works.
C. W. Jackson	Lighting.	....	....	Underground	....
Monroe Electric Co	Light, heat and power.	....	....	Underground	Subject to Department of Public Works.
Galena Trust & Safety Vault Co	....	....	....	....	All to be subject to Commissioner of Public Works.
Montgomery Ward	....	....	....	Underground	All to be subject to Commissioner of Public Works.
J. H. Kedzie	....	....	....	Underground	All to be subject to Commissioner of Public Works.
Dearborn Power Co	....	....	....	....	All to be subject to Commissioner of Public Works.
C. F. Gunther	Light.	....	....	See D 44e	Subject to Mayor and Commissioner of Public Works.
University of Chicago	....	....	....	See D 44e	All construction to be subject to Commissioner of Public Works.
City Illuminating Co	....	....	....	Aerial or underground	All construction to be subject to Commissioner of Public Works.
Gerts-Arnold Electric Co	....	....	....	Underground	All construction to be subject to Commissioner of Public Works, and operation to future action of council.
Inter-Ocean Newspaper	....	....	....	Underground	All construction to be subject to Commissioner of Public Works, and operation to future action of council.

Detroit. (D 44 *a, b, c.*) No provisions.

(44 *d*) A and B. The companies are not to injure the public or private property, and are to hold the city harmless for injury to persons or property. When the pipes and wires are laid in the streets and alleys, they are to be parallel with the curb, and between the curb and the line of the abutting lots within three feet of the curb stone, and not to exceed two feet deep. The service pipes are to be connected with the main in the alley or the one laid on the side of the street next to the property to be served. The companies are to notify the department of public works at least 24 hours before opening any street or alley, and are to restore the street or pavement to good condition, and keep it in such condition for one year, and are to employ none but skilled workmen where skill is required, and to give the board of public works the option of restoring the streets to order at the expense of the company, and to pay the expense incurred by the city in enforcing these provisions. The companies are especially made subject to all existing ordinances, and any future ones. By Sec. 8 of amended franchise ordinance of A (the Edison), the company agrees, upon six months' notice by the city, to remove all its overhead wires and poles and put the wires underground. Sec. 11 of the ordinance of the Detroit Electric Light and Power Co., previously referred to, contained a like provision.

South Norwalk. (D 44 *a, b, c.*) No provisions.

(D 44 *d*) The matter not mentioned in the charters, but is regulated by the city authorities (under Secs. 3945 and 3946, Revised Statutes in force in 1898), subject to an appeal to the courts. The city has passed no general ordinances on this, save the ordinance relating to the street department (October 7, 1890), forbidding the opening of streets without a permit. The city, however, deals with each petition for a location as it arises. The city also passed an ordinance of July 7, 1902, placing the supervision of the electric company under the electrical commissioners.

D 45. In like manner, state for each the provisions regarding plant and equipment.

D 46. In like manner, state for each the rights reserved to the city to regulate operation.

D 47. In like manner, state for each the provisions as to taxation.

D 48. In like manner, state for each the provisions as to compensation, including all free services.

Chicago.

Name.	*Plant.* 45	*Reserved Rights.* 46	*Tax.* 47	*Compensation.* 48
American Gas Engine Electric Co.	......	......	......	Pay city 5 per cent. gross receipts.
Auburn Park Electric Light, Power, Heat & R. R. Co.	......	Subject to action (of city?)	......	Use of poles for fire alarm and police telegraph service.
Otto V. Bachelle	......	......	......	Free use of conduits; 5 per cent. gross receipts.
Chicago Sectional Electric Underground Co.	......	......	......	City to have use of one duct; to pay $500 each month till sum of $10,000 is paid.
Citizens' Electric Lighting & Power Co.	......	......	......	....
John L. Cochran	......	......	......	....
Consumers' Electric Light Co.	......	Subject to action (of city?)	......	5 per cent. gross receipts; 1 arc light at street crossings at city's rate.
Co-operative Electric Light Co.	......	......	......	5 per cent. gross receipts and as above.
Garfield Electric Light Co.	......	See D 44e	......	5 per cent. gross receipts to go to city.
Lake Electric Lighting Co.	......	......	......	....
Butler Lowry	......	......	......	....
Robt. C. Miller	......	......	......	....
Mutual Electric Light & Power Co.	......	See D 44.	......	Furnish city light at 10 per cent. discount; pay 3 per cent. gross receipts.
People's Electric Light & Power Co.	......	......	......	....
People's Electric Light & Motor Power Co.	......	......	......	....
Fred R. Persons	......	......	......	....
John B. Sherman	......	......	......	....
Suburban Electric Light & Power Co.	See D 44.	See D 44.	......	3 per cent. gross receipts to city; city to use poles for police and fire alarm service.
Sun Electric Light Co.	Subject to ordinance.	......	......	5 per cent. gross receipts to city.
Chicago Edison Co.	......	See D 44e	......	....

Name.	*Plant.* 45	*Reserved Rights.* 46	*Tax.* 47	*Compensation.* 48
Commonwealth Electric Co.	......	See D 44e	......	Top cross-arm each pole for city use, telephone and telegraph, and conduits same; 3 per cent. gross receipts go to city.
Western Electric Light Co.	......	......	......	....
Englewood Electric Light Co.	......	......	......	....
Fort Wayne Jenny Electric Light Co.	......	......	......	....
Hartwig & Ahlswede	......	......	......	1 arc at street crossings at city's price; 5 per cent. gross receipts to city.
Hyde Park Electric Light & Power Co.	......	......	......	Hyde Park is to have the use of conduits for telegraph service.
Thomson-Houston Light Co. (Hyde Park)	See D 44e	Subject to ordinance.	......	Use of poles and conduits for fire alarm and police telegraph reserved to Hyde Park.
Lake View Electric Light Co.	......	......	......	....
Town of Lake Electric Light Co.	......	See D 44.	......	....
Western Electric Co.	......	Poles subject to action of board.....	......	....
Western Light & Power Co.	......	......	......	....
Herman Grossman & Co.	......	......	......	This is a small private plant.
Cosmopolitan Electric Co.	To cost $100,000...	Subject to council..	......	3 per cent. gross receipts to city.
C. W. Jackson	See D 44e	Subject to ordinance.	......	10 per cent. gross receipts to city.
Monroe Electric Co.	See D 44e	......	......	Same as above, as well as paying ascertained price for sidewalk use.
Galena Trust & Safety Vault Co.	See D 44e	See D 44e	......	10 per cent. gross receipts to city.
Montgomery Ward	See D 44e	See D 44e	......	10 per cent. gross receipts to city.
J. H. Kedzie	See D 44e	See D 44e	......	10 per cent. gross receipts to city.
Dearborn Power Co.	See D 44e	See D 44e	......	10 per cent. gross receipts to city.
C. F. Gunther	See D 44e	See D 44e	......	10 per cent. gross receipts to city.
University of Chicago	See D 44e	See D 44e	......	10 per cent. gross receipts to city.
City Illuminating Co.	See D 44e	......	......	10 per cent. gross receipts to city.
Gerts-Arnold Electric Co.	See D 44e	......	......	10 per cent. gross receipts to city.
Inter-Ocean Newspaper	See D 44e	See D 44e	......	$100 per annum, and 10 per cent. gross receipts to city.

Detroit. (D 45.) No provisions.

(D 46. No provisions in the ordinances on this matter. Under the charters of the companies, they are subject to reasonable regulation and restriction by the city.

(D 47 and 48.) These matters are not mentioned.

South Norwalk. (D 45.) No provisions.

(D 46.) No rights reserved so far as electricity is concerned. Under the general statute of June 1, 1903, the city has the right (Sec. 13) to regulate the speed of trains, and to determine with great detail the location of all parts of the system on, over or under the public grounds or ways.

(D 47.) See answer to D 21.

(D 48.) No provisions.

D 49. In like manner, state for each the provisions as to street paving.

D 50. In like manner, state for each the provisions regarding removal of wires.

D 51. In like manner, state for each the provisions as to examination of records.

D 52. In like manner, state for each the provisions as to audit of accounts.

Detroit. D 49. A and B. The company is required to restore the pavement and keep it in repair for one year.

D 50. A and B. There are no provisions for removing the wires at the end of the franchise, but the companies are required to put the wires underground as fast as ordered by the city, upon six months' notice.

D 51. No provisions.

D 52. No provisions.

South Norwalk. D 49. Answered under D 23.

D 50. Answered under D 24.

D 51. No public inspection is provided for. Under the original charter of the Norwalk Gas Light Company (Acts of 1856). turned into an electric company by the act of April 7, 1887, and later absorbed into the Connecticut Railway and Lighting Company, books are always to be open to the stockholders; while the general railway law, applying to street railways (Act of June 1, 1893), declares that the books of every railroad company shall be open to the inspection of any committee of the General Assembly appointed for that purpose.

D 52. Answered under D 51.

D 53. In like manner, state for each the provisions as to publication of reports.

D 54. In like manner, state for each the provisions as to returns to public authorities.

D 55. In like manner, state for each the provisions as to transfer of franchise to third parties.

Chicago.

Name.	*Paving.* 49	*Removal of Wires.* 50	*Examination of Records and Audit of Accounts.* 51, 52
American Gas Engine Electric Co.	See D 59.	....	City Clerk or Comptroller to have access to books.
Auburn Park Electric Light, Power & R. R. Co.	See D 59.	Wires to be placed underground at will of board.	....
Otto V. Bachelle	See D 59.	....	....
Chicago Sectional Electric Underground Co.	See D 59.	....	....
Citizens' Electric Lighting & Power Co.	See D 59.	....	....
John L. Cochran	See D 59 and D 60	Wires to be placed underground at will of board.	....
Consumers' Electric Light Co.	See D 59.	....	Sworn semi-annual statements to be made to City Comptroller.
Co-operative Electric Light Co.	See D 59 and D 60	....	Ditto.
Garfield Electric Light Co.	See D 59.	....	Ditto.
Lake Electric Lighting Co.	See D 59.	....	....
Butler Lowry	....	....	....
Robt. C. Miller	See D 59; also permits required before excavating ...	....	....
Mutual Electric Light & Power Co.	See D 59; also permits required before excavating ...	Subject to council order.	....
People's Electric Light & Motor Power Co.	See D 59.	....	....
People's Light & Power Co.	See D 59.	....	....
Fred R. Persons	See D 59.	....	....
John B. Sherman	See D 59.	....	....
Suburban Electric Light & Power Co.	See D 59.	See D 44.	Comptroller and City Clerk to have access to books.
Sun Electric Light Co.	See D 59.	....	Ditto.

Name.	*Paving.* 49	*Removal of Wires.* 50	*Examination of Records and Audit of Accounts.* 51, 52
Chicago Edison Co.	See D 59.	....	....
Commonwealth Electric Co.	See D 59.	....	Comptroller has access to books.
Western Edison Co.	See D 59.	....	....
Englewood Electric Light Co.	See D 59.	....	....
Fort Wayne Jenny Electric Light Co.	....	....	....
Hartwig & Ahlswede.	See D 59.	....	....
Hyde Park Electric Light & Power Co.	See D 59.	....	....
Hyde Park Thomson-Houston Light Co.	See D 59.	....	....
Lake View Electric Light Co.	See D 59.	....	....
Town of Lake Electric Light Co.	See D 59.	........[1]	....
Western Electric Co.	Subject to Superintendent Public Works.	To be removed at will of board	....
Western Light & Power Co.	See D 59.	To be moved to allow derricks, etc., to go under	....
Herman Grossman & Co.	See D 59.	....	....
Cosmopolitan Electric Co.	See D 59.	....	When compensation begins, Comptroller to have access to books.
C. W. Jackson.	See D 59.	....	Comptroller to have access to books.
Monroe Electric Co.	See D 59.	....	Comptroller to have access to books.
Galena Trust & Safety Vault Co.	See D 59.	....	Comptroller to have access to books.
Montgomery Ward	See D 59.	....	Duly authorized officer of city to have access to books.
J. H. Kedzie.	See D 59.	....	Ditto.
Dearborn Power Co.	See D 59.	See D 44.	Ditto.
C. F. Gunther.	See D 59.	See D 44.	Ditto.
University of Chicago.	See D 59.	....	City Comptroller to have access to books.
City Illuminating Co.	See D 59.	See D 44c.	Ditto.
Gerts-Arnold Electric Co.	See D 59.	See D 44.	Ditto.
Inter-Ocean Newspaper Co.	See D 59.	....	Ditto.

---

[1] "Where consumption of electricity would be limited, said company may supply the same by conductors above ground," is an exception to ordinance.

Chicago.

Name.	*Reports.* 53	*Returns.* 54	*Transfer of Franchise.* 55
American Gas Engine Electric Co.	......	....	....
Auburn Park Electric Light, Heat, Power & R. R. Co.	......	....	....
Otto V. Bachelle	......	....	Right to transfer or combine to fix price reserved. (?)
Chicago Sectional Electric Underground Co.	......	....	This company may lease but said lease shall not be assignable.
Citizens' Electric Lighting & Power Co.	......	....	Rights descend to assignee.
John L. Cochran	......	....	Rights descend to heirs and assigns.
Consumers' Electric Light Co.	......	See D 51	....
Coöperative Electric Light Co.	......	See D 51	Not transferable.
Garfield Electric Light Co.	......	See D 51	....
Lake Electric Lighting Co.	......	....	....
Butler Lowry	......	....	....
Robt. C. Miller	......	....	....
Mutual Electric Light & Power Co.	......	....	All rights of transfer or combination very carefully reserved on penalty of forfeiture.
People's Electric Light & Motor Power Co.	......	....	Rights to descend to heirs or assigns.
People's Light & Power Co.	......	....	....
Fred R. Persons	......	....	....
John B. Sherman	......	....	Right of transfer carefully stipulated.
Suburban Electric Light & Power Co.	......	....	....
Sun Electric Light Co.	......	....	All transfer of combination of any kind forbidden on pain of forfeiture.
Chicago Edison Co.	......	....	....
Commonwealth Electric Co.	......	....	....
Western Edison Co.	......	....	....
Englewood Electric Light Co.	......	....	....
Fort Wayne Jenny Electric Light Co.	......	....	Privileges extend to successors.
Hartwig & Ahlswede	......	Sworn semi-annual statements	Non-transferable.
Hyde Park Electric Light & Power Co.	......	....	Transfer of franchise without consent of board forfeits same.

Name.	*Reports.* 53	*Returns.* 54	*Transfer of Franchise.* 55
Hyde Park Thomson-Houston Light Co.	......	....	....
Lake View Electric Light Co.	......	....	....
Town of Lake Electric Light Co.	......	....	....
Western Electric Co.	......	....	....
Western Light & Power Co.	......	....	....
Herman Grossman Co.	......	....	....
Cosmopolitan Electric Co.	......	Sworn annual statements to city......	....
C. W. Jackson	......	File annual statements; same not to be binding on city.	Right of transfer carefully withheld.
Monroe Electric Co.	......	....	Right of transfer carefully withheld.
Galena Trust & Safety Vault Co.	......	File annual statements; same reviewable by city...	Right of transfer carefully withheld.
Montgomery Ward	......	See D 52..........	Right of transfer carefully withheld.
J. H. Kedzie	......	See D 52..........	Right of transfer carefully withheld.
Dearborn Power Co.	......	Statementsquarterly; reviewable by city.	Right of transfer carefully withheld.
C. F. Gunther	......	Statementsquarterly; reviewable by city.	Right of transfer carefully withheld.
University of Chicago	......	....	Right of transfer carefully withheld.
City Illuminating Co.	......	....	Right of transfer carefully withheld.
Gerts-Arnold Electric Co.	......	Quarterly statements; not binding on city...........	Right of transfer carefully withheld.
Inter-Ocean Newspaper Co.	......	Quarterly statements; not binding on city...........	Right of transfer carefully withheld.

Detroit. D 53 and 54. No provisions.

D 55. For franchise B (Peninsular Electric Light Co.), no provisions. For franchise A (Edison Co.), such transfers prohibited under penalty of forfeiture.

South Norwalk. D 53. No publication of reports required.

D 54. General act of June 22, 1903, requires all corporations having capital stock, except banks, trust companies, insurance and surety companies, railway or street railway companies, building and loan associations, and investment companies, under a penalty of $100, to make a return to the secretary of state under oath, giving the names and addresses of the officers and directors; amount of capital stock which has not been paid in full, with the amount due thereon; the location of its principal office, and the name of the person in charge of the office upon whom process may be served. This report is certified by the secretary of state and then recorded by the town clerk. The context shows that the object of this act is not to control the actions of the company, but to enable the state to keep track of it for the purpose of serving legal process. The Connecticut Railway and Lighting Company, as a company, makes annual reports to the state railroad commissioners.

D 55. Under the charter of the Connecticut Railway and Lighting Company (May 2, 1899, as amended April 30, 1901), the company has express authority to sell or lease any of its property, rights and franchises, and to acquire the stock, bonds, rights and franchises of any other company by purchase or lease.

D 56. In like manner, state for each the provisions as to labor.

D 57. In like manner, state for each the provisions as to other important matters, including renewals.

See also D 57 *a, b, c, d.*

Chicago.

Name.	*Labor.* 56	*Extensions.* 57
American Gas Engine Electric Co.	....	....
Auburn Park Electric Light, Power, Heat & R. R. Co.	....	....
Otto V. Bachelle	....	Not to be obliged to make extensions until consumers enough to pay 6 per cent. on cost shall petition council for same.
Chicago Sectional Electric Underground Co.	....	Not to be obliged to make extensions until consumers enough to pay 6 per cent. on cost shall petition council for same.
Citizens' Electric Lighting & Power Co.	....	....
John L. Cochran	....	....
Consumers' Electric Light Co.	....	To extend at order City Council, but not before a rate of 6 per cent. on cost can be made.

Name.	*Labor.* 56	*Extensions.* 57
Co-operative Electric Light Co	....	To extend at order City Council, but not before a rate of 6 per cent. on cost can be made.
Garfield Electric Light Co	....	....
Lake Electric Lighting Co	....	....
Butler Lowry	....	....
Robt. C. Miller	....	....
Mutual Electric Light & Power Co.	....	See "other" (D 57d).
People's Light & Motor Power Co.	....	....
People's Light & Power Co	....	....
Fred R. Persons	....	....
John B. Sherman	....	....
Suburban Electric Light & Power Co.	....	....
Sun Electric Light Co	....	Same as Western Edison, which see.
Chicago Edison Co	....	....
Commonwealth Electric Co	....	....
Western Edison Light Co	....	Extend on majority vote Council only upon petition of property owners showing said extension will pay 6 per cent. on cost.
Englewood Electric Light Co	....	....
Fort Wayne Jenny Electric Light Co.	....	....
Hartwig & Ahlswede	....	Same as Western Edison, which see.
Hyde Park Electric Light & Power Co.	....	....
Hyde Park Thomson-Houston Light Co.	....	....
Lake View Electric Light Co	....	Same as Western Edison Co., which see.
Town of Lake Electric Light Co	....	....
Western Electric Co	....	....
Western Light & Power Co	....	....
Herman Grossman Co	....	....
Cosmopolitan Electric Co	....	....
C. W. Jackson	....	....
Monroe Electric Co	....	....
Galena Trust & Safety Vault Co	....	....
Montgomery Ward	....	....
J. H. Kedzie	....	....
Dearborn Power Co	....	....
C. F. Gunther	....	....
University of Chicago	....	....
City Illuminating Co	....	....
Gerts-Arnold Electric Co	....	....
Inter-Ocean Newspaper Co	....	....

Detroit. D 56. No provisions in either of the two franchises, A and B, except that the company is to employ skilled workmen where skill is required—a provision sufficiently vague to be perfectly harmless.

D 57. The subject of renewals is not mentioned in any of the franchises.

Electric conductors must be insulated in all cases to the satisfaction of the fire marshall.

South Norwalk. D 56. No provisions.

D 57. A perpetual charter giving perpetual street rights needs no renewal.

Chicago. D 57*a.* Commonwealth Electric Co. and Cosmopolitan Electric Co. Special provisions: A $10,000 guarantee required against injury to streets, pipes, etc. Not more of an opening to be made than is necessary. All excavating down town to be done between 9 P. M. and 6 A. M. Aerial wires to be guarded by guard wires or other device. Only underground conduits to be used in all but a few down town streets (as stipulated: a territory bounded by North avenue, Lake Michigan, Wells street, Lake street, running west to Ashland, to Sixteenth, to Butterfield, to Fifty-fifth, to the lake).

Where above-mentioned wires are placed underground said company shall, for the purpose of reaching their subscriber, have the privilege of bringing the wires to the surface every four blocks, attaching them to houses and carrying them over roofs with the consent of property owners. Where consent is refused, the company may use poles on permission of commissioner of public works.

Chicago. D 57*b.* Common provisions. A. Restoration of streets. All the franchises have some provision for properly restoring streets. In a few cases, usually minor, the provision reads: "When said company shall open streets * * * it shall forthwith restore the same to as good condition as they were before, to the satisfaction of the Commissioner of Public Works."

Usually, however, and always in City Council franchises, the provision is: "No street paving to be disturbed until there is deposited with the Commissioner of Public Works a sum estimated to be sufficient to cover the cost of replacing the same." But see also D 57*c*, following.

B. Indemnity bond. An indemnity bond is always required, to protect the city against personal injury suits.

Chicago. D 57*c.* Method of construction. Chicago Sectional Electric Underground, John Cochran and Citizens' Electric Lighting and Power Co.: Where boards are reached in block paving they are to be removed, not cut except by special permission..

American Gas Engine Electric Co. Conduits to be not less than four feet below the surface of the street, to be reached by digging, not boring.

Chicago. D 57*d.* Other provisions. Chicago Edison Co. Grant includes right to lay system of steam pipes for heating.

Fort Wayne Jenny Electric Light Co. Poles are not "unnecessarily" to interfere with traffic, and city is given privilege of prosecuting any who trespass on them.

Mutual Electric Light and Power Co. Unless a plant is completed within one year, worth $40,000, $10,000 paid to the city. Plant to be enlarged so as to include service for whole territory in five years.

Sun Electric Light Co. Mayor to appoint one person who shall be elected a director of the company.

Chicago Sectional Underground Electric. May use wires for telephone, as well as light service.

Hyde Park Electric Light and Power Co., Mutual Electric Light and Power Co. and Co-operative Electric Co. Joint users of conduits with other companies at a fair price to be determined by board or council making grant.

D 58. Has the municipality experienced difficulty in forcing companies to live up to the terms of their franchises?

Chicago. As explained above, the municipality has few facilities for finding out whether the companies have been living up to their franchises or not, and most of the important franchises were granted at a time when few safeguards were thought necessary. In some matters, such as, for instance, the use of guard wires under the Commonwealth franchise, no enforcement has ever been expected or attempted. In a general way it may be said that the city has required very few things which the companies would not naturally do of their own accord, and that with regard to other things, which the companies would prefer not to do, the city makes no adequate provision for finding out whether they do them or not. The most recent franchises have been drawn with a considerable degree of care. In fact, it may be said that the art of drawing franchises in Chicago has shown enormous improvement during the last five years.

Detroit. No. First, for the reason that the management of the companies has been highly conciliatory; and, next, from the fact that the ordinances contain nothing but ordinary police regulations, and could not be successfully resisted, except the forfeiture clauses. I have already expressed a doubt of the legality of this clause. It certanly is not "important, if true." At least, all the franchises have actually passed into the hands of the Edison company, and no attempt has ever been made to forfeit any franchises. So far as I know, no suggestion looking in this direction has ever been made.

South Norwalk. The company is virtually independent of the city. There has been a great deal of friction between the company and the city, but it hardly comes within the terms of this question. In some instances the city seems to exact more than its legal due from the company on the same ground that it established its own electric lighting department apparently without legal authority.

D 59. State what provisions it has not been able to enforce, and why.

Chicago. Provisions such as compensation, restoration of streets, etc., have been enforced without much difficulty, although the former has been exacted with too much dependence upon the figures furnished by the companies, and the latter has not always been done with the perfection which an ideal city government would require. So far as known, the guard wire provision is the only one that the city has consciously failed to enforce, the reason in this case being because the department of electricity did not want any more wires in the streets.

Detroit. As previously explained, there has been nothing to enforce.

South Norwalk. The city seems to have held the company up pretty well to the fulfillment of its duties, although these duties, as defined in the charter, are marvellously few and somewhat vaguely defined.

D 60. What remedies, penalties and means of enforcing the above provisions (D 37-57) have been provided?

Chicago. With but a few exceptions the penalty provided is forfeiture. Apparently there has never been any occasion for enforcing this penalty. That is, the city has never felt that a company deserved to have its franchise taken away from it. Of course, sometimes a company has gone out of business, and its franchise has lapsed. In other cases, where the company has not begun or completed its work in the time specified in the franchise, and has thereby laid itself open to a forfeiture of its franchise, the council has allowed it an extension of time.

Detroit. There has been nothing to enforce.

South Norwalk. Under the Connecticut system of creating corporations and defining their powers, there is virtually nothing left to the cities, except the general police power over the streets. So far as the companies give a safe, cheap and convenient service, they seem to do so from purely business motives, and not because they are required to do so by ordinance.

D 61. How much deliberation has usually been given in the granting or renewal of franchises?

Chicago. In the early days, very little. More recently, a great deal. In cases like the Cosmopolitan and the Commonwealth, the object has been the granting of a valuable favor to certain political interests, and not the establishment of a legitimate lighting business. In such cases there has been a public scandal. There has been less publicity than desirable, and the grants have been largely drafted by persons interested. At the present time the mode of procedure in the granting of an electric lighting franchise is about as follows: The person or company desiring a franchise confers with the alderman of the ward in which the plant is to operate. This alderman introduces the matter into the council. It is referred to the Committee on Gas, Oil and Electric Light. This committee holds public hearings. It refers the wording of the ordinance to the corporation counsel. Having reached a decision, it makes a report to the council. This report is printed in the council proceedings, and forms the basis for discussion when the matter is taken up by the council as a whole. At present it looks as if no electric lighting franchise would ever again be granted in Chicago without full opportunity for publicity.

Detroit. This depends entirely on how far back you go. At present and, in fact, for a decade or more, a high degree of publicity has been given in fact, and for several years such publicity has been required by the rules.

South Norwalk. There are no franchises granted, or that can be granted under the South Norwalk charter. These matters are entirely regulated by the state legislature, unless reference should be made to the famous controversy on laying the railroad tracks under the Washington and Monroe street bridges (act of June 25, 1895). This act expressly forbade the laying of all such tracks without the consent of the city. A large part of the activity of the council for eight years was concerned with the petitions of the company for permits under this act. Numerous special city meetings on the subject were held, and special reports of engineers were obtained. It was not until May 1, 1903, that final permission was given.

While franchises are not granted, the rights of the city to control the placing of poles, wires and railroad tracks in particular parts of the streets have been exercised with great publicity and deliberation. Plans and specifications are submitted in great detail; are held under consideration for a long time; are frequently changed; and are not infrequently referred to a special city meeting.

D 62. Has the exercise of the franchise granting power been attended with public scandal, and if so, in what respects?

Chicago. There have been some scandals. The Cosmopolitan ordinance, for instance, was passed during the last days of the Hopkins administration (1895), and the circumstances surrounding its passage were so questionable that the succeeding council almost immediately repealed it. The repeal was invalid. The company took the case into the courts, and the courts held that a contractual relation had been established which the city was not at liberty to dissolve. The Edison company franchise was not a scandalous franchise.

Detroit. Not in recent years. Too much publicity has been given to franchises since the days of the mayoralty of Mr. Pingree (beginning in 1890) to permit of scandals. The last great scandal was in the early days of 1893, when Mayor Pingree dramatically turned over the money in the council which he said had been paid to a member for his vote on the electric lighting contract. This furnished the immediate occasion for putting through the public electric lighting bill of 1893.

South Norwalk. So far as I can find out, there have been no scandals in regard to the dealing of the city with public service corporations. In this connection it should not be forgotten, however, how limited the powers of the city are. Properly speaking, the powers consist in a very general regulation of the particular location within the street, with no power to prevent the company from doing business in the city.

D 63. How much publicity has usually accompanied the granting or renewal of franchises?

Chicago. Answered under D 61.

Detroit. Answered under D 61 and D 62.

South Norwalk. There are no franchises. The City of South Norwalk gives more deliberation and more publicity to the granting of locations within the streets than many American municipalities give to the granting of valuable franchises.

D 64. By whom are franchise grants usually drafted?

Chicago. Answered under D 61.

Detroit. Usually drafted in the first instance by the persons seeking franchises, but thoroughly worked over by committees of the council, assisted by the city law department. There is a marked tendency in Detroit now to make proposed franchises a matter of campaign discussion in the elections, and to submit them to popular vote.

South Norwalk. South Norwalk is not only a small place where people generally know each other, and know what is going on, but for something like twenty years it has had the same wide-awake corporation counsel, a man of large political influence. All legal documents involving action by the city are examined with great care by him.

LABOR AND POLITICS

United States Electricity Works*

(Schedule II)

By J. W. SULLIVAN and JOHN R. COMMONS

South Norwalk.

The electricity works of South Norwalk are placed by a city ordinance (July 7, 1902) under the authority of a board of Electrical Commissioners. The three members of this body are elected by the City Council. They are chosen from the ranks of the citizenship of South Norwalk and are not Council members. They serve three years, the term of one member expiring each year, the purpose being thus to secure the advantages of continuity and experience. The Board, however, submits matters of unusual importance—appropriations for extensive enlargements, etc.,—to the Council, which submits the annual budget to the voters at the polls. On the other hand, the Board commits the management of details to the superintendent, meeting every Saturday afternoon to hear his report for the week. The discharging of a wage-worker is matter for consideration by the Board should the man dismissed feel that he is aggrieved and wishes to appeal. The hiring of men is subject also to its approval. In so small a force the opinion of the community has an influence, felt if not expressed. The selection for the Board of men who are not members of the Council and the prevalence of the understanding in the community that they shall remain undisturbed in office serve to break the force of any sinister influence that might possibly emanate either from the Council or designing politicians. A South Norwalk man wanting employment at the works is not impelled to ask the aid of a ward boss or a Councilman. He looks to one of the four men in actual control of the plant. The superintendent, upon whom is thrown the responsibility of its efficiency, is guaranteed in maintaining his own rights of final decision.

The number of employees is only eight—the smallest of all the undertakings investigated. Yet it is the only municipal enterprise on our list that furnishes commercial lighting and power, and consequently, relative to the population of the town or of other towns of similar size having only street lighting plants, it is of more significance than the others. On account of its size, the division and specialization of labor is not carried very far. The mechanics are all-round men. The two engineers act as dynamo tenders and switchboard men. The lamp trimmers, the linemen and the meter readers perform other duties as well. Definite hours of labor are not adhered to, and men are off and on during the day, relieving one another or quitting when their work is done. All of them are treated as salaried employees and get one week's vacation with pay. They draw full pay when sick during the period of illness. The longest individual case was eight weeks.

---

* The subject matter of Schedule II. for the Chicago municipal electric works is discussed in connection with the Chicago municipal waterworks on pages 136-147 of this volume.

Some time ago the electrical workers' union of Bridgeport proposed to organize the men, but did not propose to ask increased pay for them. On this account they have not joined the union, but the latter adopted a resolution recognizing the municipal establishment as a "fair shop" and permitting its members to work with the municipal employees, as though they were union members.

Wages of the employees are as follows, comparison being made with rates paid by the traction, lighting and telephone companies where possible. The station engineers get $17 and $21 per week of 70 hours, corresponding to $18 paid by the traction company. Firemen $16 for 84 hours, against $14 for the same time. Trimmers $14 in both cases. Linemen $17 for 8½ and 10½ hours on alternate days the year round, compared with $14 to $18 for eight hours when employed, the union scale being $15 for eight hours. Collectors $16 per week.

Allegheny.

The Allegheny Municipal Lighting enterprise was investigated piecemeal on four occasions: November, 1905, and February, August and December, 1906. On the first occasion the assistant superintendent, a practical electrician, was found to be thoroughly dissatisfied with the sort of political control which prevented him from appointing his subordinates, for whom he was supposed to be responsible, and which gave him too many men in some positions and not enough of the right kind in other positions. At the time of the second visit, this electrician had become so outspoken in his criticisms that he and some of his subordinates had openly taken the political field in support of an independent candidate for Mayor on a platform which promised a business administration of the works. In doing this he knowingly jeopardized his position, but he felt that if the regular Republican candidate were elected the position would continue to be such a one that a self-respecting electrician could no longer hold, while if his reform candidate should be elected the position would be desirable. In the election that followed, the reform candidate was defeated, and on the occasion of our third visit, in August, the electrical engineer was found holding a responsible position in the service of a private lighting company. Ten or twelve of his subordinates had also lost their positions with him, though some of them have been reinstated. The administration, or "machine," ticket which was successful in the election referred to was headed by the present Mayor, who had been chairman of the Joint Finance Committee of the Common and Select Councils, and who in that position had carried through the ordinance donating to the Pennsylvania Railway Company a strip of land estimated to be worth $1,000,000, which had been given to the City of Allegheny by the State of Pennsylvania for park purposes. The legality of this donation is now being tested in the courts by a number of private citizens. The Mayor was considered to be the candidate of the Railroad Company, in view of the company's desire to secure additional property belonging to the city worth several million dollars. Partly for this reason he was opposed by the reform or independent candidate. The City Solicitor, appointed by the Mayor, is influential in the State political organization of the party. The Director of Public Works, in charge of the municipal electric lighting establishment, together with the other bureaus of municipal works, is a practical man, and considered, partly from his social connections, to be an improvement on the political incumbent of the preceding administration. His subordinate, the Superintendent of the Bureau of Public Lighting, the head man of the electric works, had received his appointment under a former administration on political grounds, having previously been a locomotive engineer and afterwards a stationary engineer. Under the Allegheny system, the control of the bureau is complex, so that responsibility cannot be located. The Superintendent and his superior, the Director of Public Works, have direct administrative relations with the joint Finance Committee (four members of the Select Council and twelve members of the Common Council), and with the Public Works Committee (six members of the Select and sixteen of the Common Council), and with the latter's sub-Committee on Lighting (two members of the Select and four of the Common Council), besides having responsibility to the Mayor and the two Chambers of the Council. The 15 Select Councilmen are elected for four years, the 39 Common Councilmen for two years.

The Chairmen of the Select and Common Councils name all of the Committees. One of these Chairmen has been an employee of the Baltimore and Ohio Railroad for twenty years; the other is a capitalist, President of the Standard Sanitary Manufacturing Company—the "bathtub trust"— representative in this district of the State Board of Charities, which distributes State funds to private charities, and the closest business associate of the late Cashier of the Enterprise Bank, who committed suicide when his loans to politicians were uncovered. The joint committees of the Council named by these Chairmen are in harmony with the administration. The three principal Committees having to do with electric light and franchises, are the Finance, Public Works, and Corporations Committees. The membership of these joint committees is four or six from the Select Council and twelve or sixteen from the Common Council. The thirty-five individuals who compose these committees are as follows: eleven contractors, ten manufacturers or representatives of corporations, four clerks, three merchants, three physicians, one banker, one real estate agent, one wage earner, and one barkeeper. One of the contractors has school-house work for the Board of Education, another is a subcontractor on public work, another gets the contracts from property owners when they are notified to improve streets and sewers, another has had most of the contracts for moving houses for private persons in the many cases where houses have been moved on the order of the Council for street widening, the city paying the owner a lump sum for the work; three of the contractors do most of their work for the railroad and street car companies and three do miscellaneous private work, while one has withdrawn from the contracting business and has become a professional politician. The manufacturers, or employers, are, with one or two exceptions, prominent and wealthy men, interested in large manufacturing railroad and public-service corporations. One of these is Treasurer of the Electric Lighting Company, another is connected with the street car company. The physicians are of high standing, as are two of the merchants. One of the clerks or salesmen is employed by a branch of the street car company, and the others in private houses. The barkeeper took the place of his employer, a saloon keeper, who resigned because the court, under the law, refused a license to him as being a city official. The banker is not now in the business, having been an official of the Enterprise Bank.

Prior to the present year the nomination and election of the city officials and Councilmen was in the hands of the political organizations under rules formulated by them and under clerks, judges, and watchers appointed by them. During the present year, the new primary election law has gone into force, but has not materially changed the conditions. The political organization of the party in power assesses all of the office-holders and employees, the assessment in the Lighting Department being 2 per cent. on the year's salary or wages. At the time of the last election the street railway company, which operates both in Pittsburg and Allegheny, posted notices to the effect that their employees were not expected to do any political work. About 20 per cent. of their motormen and conductors have received their positions on recommendations of Councilmen and politicians. The public-service corporations have in times past received all of the franchises and privileges desired, and have not taken an active part in the selection of the present Councils, although the administration and the majority of the Councils is favorable to the street car company. The lighting companies have made no proposition in connection with the city's public lighting. The dominating influences of the community are the Pennsylvania Railroad Company and the State political organization.

The influence of Councilmen and Mayors is seen in various features of the electric lighting plant. The land of the power station, which is badly situated away from the river front, was purchased from a friend of the Mayor at the time. After a fire at the station four years ago, the plant was rebuilt by a firm of contractors in which Councilmen were interested. Appropriations for technical equipment have been neglected, so that, for example, the electrician had to build his own switchboard out of such junk material as he could collect from machine shop yards. The three large dynamos installed in 1904-1905 were ordered in the spring of 1902, and were from two to three years being put in place. Between these dates the turbine came into use. One of the engines lay in the street uncovered thirteen months.

The number of employees, except in the case of linemen, is greater than is necessary to do the work. Six or eight of the force could be dispensed with, reducing the pay-roll 15 per cent. to 18 per cent. At election time a half dozen extra laborers have been put on.

Employees take part in the primaries and elections on behalf of Councilmen and officials or of the party in power. The system of assessments for campaign purposes has an exception in the case of the linemen. These assessments had always been paid by all employees as far back as any of them could remember. The method of collection is such that no official or party agent asks a man to contribute. Each employee finds at some time during the campaign "the yellow book" at his place of work. In this "yellow book" it is stated that the undersigned voluntarily and without solicitation subscribes so much—2 per cent. of his year's wages—to be deducted from his pay envelope. The employees inform each other that "the yellow book" is on its rounds. Two years ago, when there was both a spring and a fall campaign, the linemen brought the matter up in their trade union, which had recently been organized, and protested against paying two assessments in one year. The union instructed its Secretary to address a letter to the Mayor stating that they had ordered their members not to pay any assessments. Since that time, the yellow book has not come to the linemen, and they have not paid assessments, and their positions have not been filled or vacated for political reasons. Linemen belonging to the same union, however, and employed by the neighboring City of Pittsburg, continue to pay assessments and to do political work, because they have not brought the matter to the attention of their union. As a result of this stand of the linemen theirs is the only branch of the Allegheny Lighting Bureau where the number of men is not in excess of the needs of the work. They are kept busy during the entire eight hours and receive no favors. Although the works are "open shop" and the union has no written agreement, all of the linemen are members. The other employees are unorganized. Instances of favoritism and lack of discipline among these unorganized classes of workmen have been called to our attention. A dynamo repair man was "off on a drunk" six weeks. When he returned the Councilman of his district by persistent effort obtained for him his wages for the entire time. Other cases were mentioned of men discharged for incompetency or dissipation by the works officials and reinstated by the influence of Councilmen. Superintendents have been absent in Europe on two occasions on pay for two and three months' pleasure trips. There is no rule as to sick leave, and it depends partly on political influence.

Apart from the linemen, the wages and hours of labor are regulated through political influences, and, compared with the rates paid by private companies of Allegheny and Pittsburg, the wages of the linemen are not relatively as high as the others. All employees have had the eight-hour day since the establishment of the plant, while private companies have nine and ten hours. Prior to 1902 the linemen of Pittsburg and Allegheny were paid $2 and $2.50 for nine or ten hours by the private electric companies, and $2.25 for eight hours by the Allegheny Municipal Bureau. In that year, they called a general strike throughout the district, except in the municipal plant, which promptly raised their wages to $3 for eight hours. This rate continues to the present time. The union compromised with the companies on the open-shop basis and received advances to $3 for ten hours. This continued until 1906, when an opposition company came into the field with a large amount of construction work and offered $3.25 for nine hours. One of the other companies in November advanced the pay to $3.25 for ten hours. The telephone companies pay $2.75 for nine hours. Patrolmen in the municipal plant are paid $2.75 and in the private plant in Pittsburg $1.75 to $2. The latter, however, are not of the same grade of skill, because their work is differently specialized.

Trimmers, who are unorganized both in private and municipal undertakings, get $2.50 for eight hours and about eighty lamps in the Allegheny Municipal Bureau, and $1.75 to $2 for ten hours and about one hundred lamps in the Pittsburg private company.

Wipers, oilers and similar classes of unorganized labor get $2.75 for eight hours in the municipal plant and $1.75 for ten hours in the private plants.

From these comparisons it will be seen that, while the linemen in the municipal undertaking get 12 per cent. to 25 per cent. higher wages, measured by the hour, than they do in private employment, the trimmers get 50 to 70 per cent. higher wages and the laborers 90 per cent. higher wages.

Detroit.

The Detroit Electric Lighting establishment is managed by a commission of six members, unsalaried, appointed by the Mayor and confirmed by the Council. A commissioner's term is six years, one member retiring and his successor being appointed each year. The statute does not call for a bi-partisan commission, but it has been the policy to appoint three Republicans and three

Democrats. Three of the present members are wholesale merchants, one is a large retail merchant, one a managing editor and another a mechanical engineer. The Commissioners, with one exception, from the time of their first appointment in 1893, have been business or professional men of high standing in the community. One member, a politician, resigned in 1896 after a year's incumbency.

The chief executive officers of the Commission are a Secretary and a General Superintendent. The relative weight of these two positions has changed during the history of the Commission. The first Secretary was a newspaper man, and the position was that of a clerk. The first General Superintendent was the engineer and electrician who constructed the plant; he resigned in 1896 to become General Manager of the Detroit Edison Company. For a year the Secretary acted as General Superintendent. In 1897 the positions were again separated, and the former assistant electrician was made Superintendent. The position of Secretary was filled by the former private secretary of a United States Senator, afterwards employed in the auditor's office of the street-car company. He filled the position of Secretary from 1897 to 1900, when he was appointed in the auditor general's office at Lansing, which he left to become cashier of the Customs House. His is the only appointment of a distinctly political character during the history of the Commission, and his ability made him the dominating figure in the Commission during this period. Appointments and removals were made by him rather than by the Superintendent.

In March, 1898, the Commission determined to increase the amount of work done by the trimmers and to reduce the force from 27 to 24. The trimmers organized a union and asked for a hearing. The Secretary refused, and the union in resentment of this treatment ordered a strike. The vacant places were filled by others, and the union was ultimately defeated. The other unions of the city took the matter up, but were also repulsed. During the strike the term of one of the Commissioners expired, and as he was one of those who had vigorously refused to listen to the unions and had referred them to the Secretary, the labor men induced the City Council to reject his name when he was renominated. The Mayor was then induced to nominate a wealthy manufacturer who was known to be friendly to the trade unions. Through his influence the union called off the strike and advised the trimmers to make application as individuals for reinstatement. They did so, and all but three or four were eventually taken back.

Within the next eighteen months the Mayor appointed two other Commissioners, one of whom was a leading manufacturer, also known to be friendly to unions, and this led to the resignation, in January, 1900, of three members of the Commission. The appointment of their successors effected a complete reorganization of the Commission, which since that time has worked in harmony with the unions on an "open shop" basis.

This change in the Commission resulted in displacing the Secretary, who was not re-elected on the expiration of his term. The Superintendent resigned, and his place was filled by the present Superintendent, a marine engineer and former United States supervising inspector of steam vessels for the Eighth district, and inspector of steam vessels for Lloyds. He continues to hold a position with Lloyds as adjuster of damage claims. The electrical side of the undertaking is in charge of the Assistant Superintendent, a competent electrician, who had been foreman with a firm of electrical contractors.

The selection of subordinates in Detroit is not controlled by a Civil Service Commission, and inquiry was made respecting the part played by politics in their appointment. Such political influence as could be discovered was mostly connected with the change in the Commission and the resignation of the Secretary above described, and that was a matter of trade-union hostility to a politician who was believed to dominate the Commission in the interests of private corporations. The unions used such influence as they had with the Aldermen and Mayor to bring about the change in the Commission that led to his resignation. The present Superintendent and Assistant Superintendent, appointed at the same time, are of opposite politics, but both give preference to union workmen. All of the foremen differ in politics from the Superintendent. Permanent appointments must be confirmed by the Commission on the nomination of the Superintendent, but one case was found in the Secretary's office of a position filled by the nominee of a Commissioner. Both Republicans and Democrats are found in both responsible and subordinate positions. On one occasion six years ago a circular was sent around asking employees for a political contribution, but it has not been repeated, although it is said to be passed around for signature in other departments. No other municipal enterprise investigated has received as much attention or publicity in the community. The annual reports of the Commission contain an unusual degree of itemized statement. The newspapers of Detroit give discussions of the undertaking considerable space in the news, editorial and correspondence columns.

Wages. It seems to be the policy of the Electrical Workers' Union in Detroit to pry up wages by playing the municipal plant and the Edison Company against each other. Neither is a union shop, but in both establishments all linemen, foremen and trouble men are in the union, and in both there are three or four trimmers in the union. There are no union linemen employed by the street-car company, and about two-thirds of the telephone linemen are organized. The scales are lower and the hours longer than in the municipal or Edison establishments. Both establishments have had the eight-hour day for shift men since their beginning. The municipal plant also began with eight hours for the linemen, trimmers and other day men, but the Edison Company had nine hours until 1905, when all were placed on the eight hour basis, except laborers, who work nine hours. In December, 1904, the linemen got an advance from $2.50 to $2.75 in the municipal plant, and the same advance was made by the Edison Company in May, 1905. In June, 1906, the linemen made a request for $3 from both establishments and got $2.88 from the Edison Company; but since the municipal budget had been voted by the Council in April their demand was made too late, and they contented themselves with a promise from the Commissioners to put their scale in the next year's budget.

The trimmers had no organization after their disastrous strike on the municipal plant in 1898 until 1904, when they reorganized and secured an advance from $2 to $2.25, and this was followed by the Edison Company in April, 1905. Of the fourteen trimmers in the municipal establishment, six took part in the strike of 1898, and three of them are now in the union, the others having dropped out after the wage advance of 1904. About the same proportion of union trimmers are in the Edison Company.

The amount of work done by the trimmers in the two establishments cannot be accurately compared, because the municipal lamps are out of doors and on poles and towers, while the company's lamps are in stores. The hardship of the work, especially in winter, is evidently greater in the municipal undertaking. The strike of 1898 occurred when most of the lamps were on towers, and the union objected to the increase of about ten lamps which was added to each man's circuit. The change from towers to poles was being made at the time and has continued, until now only one-sixth of the lamps are on towers. Consequently, the increased number of lamps per man can be cared for in less time than the same number when the strike occurred. The substitution of enclosed for open lamps has also reduced the number of men, so that 14 trimmers are now caring for 60 per cent. more lamps than 24 men cared for after the strike. The circuits are so arranged that the average number of lamps in a circuit is 63 and the average number of miles is six. The circuits are covered in some five or six hours and in winter within the eight-hour day. The trimmers are not required to return to the office on completing their circuits, but are required to report by telephone, and are then free for the rest of the day. Four patrolmen with horse and buggy, in addition to the trimmers, take care of all extra work at night. The rule of the Edison Company is to require the trimmers to report at the office when their work is finished and to do other duty until the end of their eight hours. For patrol duty at night the eight hours are spread out to include an evening shift, and this is distributed in rotation among the force of trimmers. Evening duty may include overtime at one and one-half rate per hour.

Owing to the different classification of engineers and electricians, the salaries and wages are not in all cases comparable. The following table shows comparisons as far as they can be made. It indicates that the Edison Company is paying higher wages or salaries to the chief engineer, foremen, firemen and linemen, and the Lighting Commission is paying higher to engineers, oilers, operating electricians, laborers and helpers. The same wages are paid to trimmers.

Wages, Detroit Electric Lighting.

		Public Lighting.	*Edison Company.*
Chief engineers	per year,	$1,320.00	$1,500.00
First engineers	per month,	100	80.00
Second engineers	per month,	75.00	$67.50 to $75.00
Oiler, condenser engine	per month,	......	$60 00
Oilers	per day,	1.90	$1.60 to $1.80
Laborers	per day,	1.75	$1.80[1]
Operating electricians	per month,	82.50	$40.00 to $80.00
Boiler foremen	per month,	......	$100.00
Firemen, foremen	per month,	......	75.00
Firemen	per day,	2.00	2.25
Helpers and coal passers	per day,	2.00	1.75
Line foremen	per day,	3.25	$3.04 to $3.69
Linemen	per day,	2.75	$2.88
Linemen helpers	per day,	$1.75 to $2.50	1.75
Trimmers	per day,	$2.25	2.25

Overtime at the Edison plant is paid time and a half, but regular rates at the municipal plant. Employees of the Edison Company get electric light at cost, but there is no private lighting from the municipal plant. After one year's employment the municipal Commission gives ten days' holiday with pay, and the Edison Company gives seven and in some cases fourteen days after three years. Both establishments have quasi-pensioners at light work on lower rates of pay than the standard. Both give sick pay, although not as a matter of contract.

---

[1] Nine hours.

ENGINEERING MATTERS

United States Electricity Works

(Schedule III)

By THEODORE STEBBINS and C. E. PHELPS, Jr.

H—CHARACTER OF SERVICE AND PLANT.

Note. The various "forms" said in the answers to be attached to this schedule are to be found in a separate bound volume of forms of each of the plants at Allegheny, Detroit, and South Norwalk, and a bound volume designated "B" for Chicago. It does not seem necessary to reproduce these forms at this point.

H 1. *Allegheny.* Data for year ending February 28, 1905.

Chicago. Data for year ending December 31, 1905.

Detroit. Data for year ending June 30, 1905.

South Norwalk. Data for year ending January 1, 1906.

DESCRIPTION OF PLANTS.

H 2. Boilers.

Allegheny.

No.	*Type.*	*Stoker.*	*Horse Power.*	*Date.*	*Total H. P.*
2	Babcock-Wilcox	Roney	250	1895	500
2	Babcock-Wilcox	Jones	250	1899	500
4	Caldwell	Jones	250	1902	1,000

Chicago. (Note.) All water tube.

No.	*Type.*	*H. P.*	*Date.*	*Total H. P.*
3	Aultman-Taylor, 168 tubes, 18 ft. by 4 in.	335	1898	1,005
1	Aultman-Taylor, 192 tubes, 16 ft. by 4 in.	380	1898	380
4	Cahall, 252 tubes, 16 ft. by 4 in........	500	1905	2,000
3	Heine, 241 tubes, 16 ft. by 3½ in.......	415	1894	1,245
3	Oil City, 237 tubes, 16 ft. by 3½ in.....	410	1900	1,230
1	Bonus-Kewaunee, 205 tubes, 18 ft. by 4 in.	460	1905	460

(Note.) Horse power figures on basis of 10 square feet water heating surface per horse power.

Detroit.

No.	*Type.*	*H. P.*	*Date.*	*Total H. P.*
7	Peck tubular with Hawley down draft furnaces	300	1895	2,100

South Norwalk.

No.	*Type.*	*H. P.*	*Date.*	*Total H. P.*
4	H. R. T., 16 ft. by 72 in....	125	(One) each, 1892 1898, 1900, 1900	500

Memo. Have 120 3-inch tubes, each grate 6 ft. by 6 ft., Lamprey water arch, N. E. roller grate. Spencer damper, boiler pressure operating 95 pounds, insured 100 pounds, by Hartford company. One tested each month.

H 3. Steam engines.

Allegheny.

No.	Type.	Speed.	Belted or Direct Connected.	Horse Power.	Date of Installation.	Total Horse Power.
2	Compound non-condensing, 20" by 36" by 36"	120	Direct connected	750	1903	1,500
1	Compound non-condensing, 16¼" by 28¾" by 18"	200	Direct connected	350	1902	350
1	Vertical compound non-condensing	300	Direct connected	60	1902	60 [1]
1	Vertical Westinghouse non-condensing	300	Direct connected	75	1902	75 [1]
1	Vertical Westinghouse	....	Belted	12	1895	12 (E)
1	Vertical Westinghouse	275	Belted	250	1895	250
4	Vertical Westinghouse	275	Belted	150	1895	600

[1] Exciters.

Chicago.

No.	Type.	Speed.	Belted or Direct Connected.	Horse Power.	Date of Installation.	Total Horse Power.
4	Vertical 20" by 45" by 20"	200	D. C. to shaft	600 [1]	1900 [2]	2,400
2	Vertical 22" by 49" by 28"	140	Belted to shaft	1,000	1894 [3]	2,000
2	Vertical 24" by 46" by 27"	150	....	1,000	1905	2,000
1	Westinghouse C. C'd, 23" by 40" by 20"	200	Belted	700	1900	700
1	Simple slide valve, 6" by 10"	200	Belted	....	....	....

[1] Horse power ratings as given by chief engineer.

[2] Two in 1898 and 1899.

[3] Rebuilt in 1903.

Detroit.

No.	Type.	Speed.	Belted or Direct Connected.	Horse Power.	Date of Installation.	Total Horse Power.
5	Marine	200	Rope driven	340	1895	1,360 [1]
1	Marine	120	Direct connected	1,000	1901	1,000
1	Willans	277	Direct connected	900	1904	900
3	Willans	465	Direct connected	100	.... [2]	300
1	Westinghouse Std.	500	Direct connected	10	1895	....

[1] 1,720 (?).

[2] Two in 1898; one in 1900.

South Norwalk.

No.	Type.	Speed.	Belted or Direct Connected.	Horse Power.	of Installation.	Total Horse Power.
4	Watertown 12" by 14" by 00"	285	Direct connected	100	.... [1]	400
1	Watertown 20" by 18" by 00"	210	Direct connected	300	1903	300

[1] Two in 1898; two in 1900.

Oiling of 100's, manual; of 300, automatic.

H 4. No water wheels in any one of the plants.

H 5. Gas engines.

No gas engines in any one of the plants.

South Norwalk. One oil engine, Diesel 4 cycle type, D. C., 225 horse power; installed in 1905; total horse power, 225.

Memo. 3 cylinders, 16 by 24 single acting, 165 R. P. M.

H 6. Auxiliary engines.

Allegheny.

No.	*Type.*	*Duty.*	*H. P.*	*Date.*	*H. P.*
2	Vertical slide valve	Blowers (120 ft.)	20	1902	40

No auxiliary engines in Chicago, Detroit or South Norwalk.

H 7. Auxiliary apparatus.

Allegheny.

No.	*Kind.*	*Duty.*
3	Goubert feed water heaters.	
2	Worthington duplex pumps, 12 by 8½ by 10	15,000 gal. P. M.
1	Ludlow duplex pump....................	400 gal. P. M.
1	350-ton overhead steel bunker.	
2	Cranes, hand operated (10 tons by 80 ft. span; and 5 tons by 20 ft. span).	

Chicago.

No.	*Kind.*	*Date.*
3	Hawley downdraft furnaces............	Installed 1898
3	Green chain grates....................	Installed 1900
5	Green chain grates....................	Installed 1905
4	Foster superheaters, 150 degrees........	Installed 1905
4	Westinghouse air compressors...........	Installed 1894, 1898 1900 and 1905
7	Baragwaneth syphon condensers, 14-inch connection	Installed, 3 in 1894, 2 in 1898, and 2 in 1900
1	Baragwaneth syphon condenser, 22-inch connection	Installed 1905
1	Baragwaneth feed water heater, 36-inch...	Installed 1894
1	Baragwaneth feed water heater, 36-inch...	Installed 1900
1	Baragwaneth feed water heater, 36-inch...	Installed 1905
1	Stillwell-Bierce open heater, 48 inches.....	1898
4	Turner gravity oiling systems, 200 gallons capacity	Installed 1898, 1899 1900, 1905
3	Brick chimneys, 96 in. by 175 ft........	Installed, 1 1894, 1 1898, 1 1905
1	Steel stack, 96 in. by 150 ft.............	(Rebuilt) 1904
1	Stillwell-Bierce duplex, 8 in. by 12 in. by 12 in. pump....................	1898
2	March single 0 and packed, 10 by 5½ by 12 pump	1905

No.	*Kind.*	*Date.*
1	Prescott duplex, 10 by 6 by 10 pump.....	1904
1	Worthington duplex 0 packed, 6 by 3½ by 6 pump	1900
2	Worthington duplex, 10 by 6 by 10 pumps.	1894
1	Worthington duplex, 10 by 6 by 10.......	1898
1	Worthington duplex, 7½ by 10 by 10 pump.	1894
1	Worthington duplex, 7½ by 4½ by 10 pump.	1900
1	Westinghouse turbine pump, 30 horse power, motor driven	1905
1	Worthington dry vacuum pump, 5 horse power, motor driven...............	1905

Detroit.

No.	*Kind.*	*Duty.*	*Date.*
1	Worthington feed pump......	100 gal. per min.......	1895
1	Fire pump	1,000 gal. per min.......	1895
2	Worthington jet condensers...	36,000 lbs. steam pr. hr....	1895
1	Worthington jet condenser....	50,000 lbs. steam pr. hr....	1904
2	Worthington comp. duplex pumps, 14 by 19 by 5 by 15	......	1895
1	Worthington duplex pump, 18 by 26 by 18............	......	1904
7	Hoppes live steam purifiers....	350 H. P. each..........	1895
7	Worthington water meters.....	......	1895
1	Wainwright heater...........	200 H. P...............	1895
2	No. 8 Westinghouse air compressors	......	1895
5	Rope transmissions...........	......	1895
350 feet	Hunt Industrial railway..	......	1895

South Norwalk.

No.	*Kind.*	*Duty.*	*Date.*
1	Worthington duplex........	4½-in. by 2¼-in. by 4-in...	1892
1	Worthington duplex........	5¼-in. by 3½-in. by 5-in...	1900
2	Am. National heaters.......	200 H. P. each.........	(1) 1892 (1) 1900
1	Pemberthy injector.........	200 H. P. each.........	1892
1	Brick stack, 4 ft. sq. by 91 ft. high	500 H. P..............	1898

H 8. Dynamos.

Allegheny.

(*a*) Direct current constant potential.

No.	*Type.*	*Voltage.*	*K.W.*	*Date installed.*	*Total K.W.*	
2	D. C Westinghouse....	110	37½		75	exciters
1	Belted Westinghouse...	110	7 (E)	unused	7	

Note. B.—Belted. D. C.—Direct connected.

(*b*) Direct current constant current.

No.	*B. or D.C.*	*Type.*	*Amperes.*	*K.W.*	*Date.*	*Total K.W.*
2	Belted	Brush	6.6	72.6	1905	145.2
8	Belted	Brush	6.6	56.1	1905	448.8
12	D. C.	Western Elec..	9.6	30.7	1895	368.6

(*c*) Alternating current.

	No.	*B. or D. C.*	*Type and Phase.*	*Voltage.*	*K.W.*	*Date.*	*Total K.W.*
8,000 alt.	2	D. C.	Westinghouse 2 phase...	2,200	500	1903	1,000
	1	D. C.	Westinghouse 2 phase...	2,200	250	1902	250

(*d*) Boosters set or motor generators.

No.	*Type.*	*Voltage.*	*K.W.*	*Date.*	*Total K.W.*
6	Westinghouse "C" motors..	2,200	125 H.P.	1905	750 H.P.

(*e*) Rotary converters.

None.

(*f*) Frequency changers.

None.

Chicago.

(*a*) Direct current constant potential.

No.	*B. or D.C.*	*Type.*	*Voltage.*	*K.W.*	*Date installed.*	*Total K.W.*
1	Belted	T.-H.	75	15	(—) old	15

(*b*) Direct current constant current.

No.	*B. or D.C.*	*Type.*	*Amperes.*	*K.W.*	*Date.*	*Total K.W.*
10	D.C. to jack shaft	Brush...	6.6	72.6	1900	726
2	Belted	Brush...	9.6	76.8	1899	307
2	Belted	Brush...	9.6	76.8	1900	307
2	Belted	Brush...	9.6	52.8	1894	211
2	Belted	Brush...	9.6	52.8	1900	211
3	Belted	Brush...	9.6	48	1898	144
21	Belted	West. Elec...	9.6	74.4	1894	1,562
4	Belted	West. Elec...	9.6	48	1894	192

(*c*) Alternating current.

No.	*B. or D.C.*	*Type and phase.*	*Voltage.*	*K.W.*	*Date.*	*Total K.W.*
1	B.	Single phase.....	(—)	30	(—) old	30
2	D.C.	3 phase 60 cy.....	6,600	750	1905	1,500

(*d*) Boosters set or motor generators.

None.

(*e*) Rotary converters.

None.

(*f*) Frequency changers.

None.

Detroit.

(*a*) Direct current constant potential.

No.	*Belted or direct connected.*	*Type.*	*Voltage.*	*K.W.*	*Date installed.*	*Total K.W.*
1	D. C.....	Northern Electric 450 r. p. m...	125	60	1904	60
1	Belted....	Northern Electric 325 r. p. m...	125	40	1901	40
1	Belted.	Westinghouse ...	125	5	1895	5
1	D. C.	“ Kodak.	125	5	1895	5

(*b*) Direct current constant current.

No.	*B. or D. C.*	*Type.*	*Amperes.*	*K.W.*	*Date.*	*Total K.W.*
20	Rope driven..	Western Elec. M. P.......	9.6	50	1895	1,000
2	D. C........	Western Elec. B. P........	9.6	57½	1898	115
1	B..........	Brush	9.6	7½	1895	7½

(*c*) Alternating current.

No.	*B. or D. C.*	*Type and phase.*	*Voltage.*	*K.W.*	*Date.*	*Total K.W.*
1	D. C....	Stanley 2 phase...	2,200	600	1901	600
1	"	" " " ...	2,200	600	1904	600
1	Rope driven.	" " " ...	2,200	175	1901	175

(*d*) Boosters set or motor generators.

None.

(*e*) Rotary converters.

None.

(*f*) Frequency changers.

None.

South Norwalk.

(*a*) Direct current constant potential.

No.	*Belted or direct connected.*	*Type.*	*Voltage.*	*K.W.*	*Date installed.*	*Total K.W.*
2	D. C......	Siemens-Halske	230-270	60	1898	120
2	"	Eddy, 6 pole...	"	60	1900	120
1	"	Ft. Wayne 8 pole	"	165	1905	165
1	"	" " " "	"	160	1905	160

(*b*) Direct current constant current.

See (*d*) H 8.

(*c*) Alternating current.

None.

(*d*) Boosters set or motor generators.

No.	*Type.*	*Voltage.*	*K.W.*	*Date.*	*Total K.W.*
1	General electric C. L. 6-90 H.P....	250	90 P.	1903	50 K.W.
1	Brush arc, 5 amperes............	10,000	50 K.W.	1903	
1	General electric C. L. 6-25 H.P. speed 785 r.m.p. Belted.........	250	25 P.	1905	7 (?)

(*e*) Rotary converters.

None.

(*f*) Frequency changers.

None.

H 9. Storage battery.

None for any of the four plants.

H 10. Transformers—Station.

Allegheny.

(*a*) Constant potential.

No.	*Primary voltage.*	*Capacity K.W.*	*Date.*	*Total K.W.*
2	2,200	25	1902	50
4	"	15	1902	60
12	2200/720	Auto Tr. for starting motors.		

(*b*) Constant current.

None.

Chicago.

(*a*) Constant potential.

No.	*Primary voltage.*	*Lights.*	*Date.*	*Total lights.*
1	6,600	200	1905	200
14	6,600	100	1905	1,400
9	6,600	80	1905	720

(*b*) Constant current.

None.

Detroit.

(*a*) Constant potential.

No.	*Primary voltage.*	*Capacity K.W.*	*Date.*	*Total K.W.*
6	2200-5500	150	1902	900
4	2200-5500	75	1904	300
2	2200-3300	50	1902	100
2	5500-5500	37½	1904	75
2	2200-5500	30	1904	60
1	2200-2200	25	1896	25
2	2200-3300	25	1904	50
2	2200-5500	25	1902	50
2	2200-2200	20	1902	40
				1600

(*b*) Constant current.

No.	*Amperes.*	*Capacity K.W.*	*Date.*	*Total K.W.*
4	6.8	63	1902	252

South Norwalk.

(*a*) Constant potential.

None.

(*b*) Constant current.

None.

DISTRIBUTION SYSTEMS.

H 11. Underground lines.

Allegheny. (*a*) Subways. None.

(*b*) Cables and wires—Total length of streets served——— miles.

None.

Chicago.

(*a*) Subways.

	Type.	*No. duct feet.*	*No. of trench feet.*	*Av. date installed.*
3″	Terra Cotta.	446,907	(——)	1901
3″	Steel pipe...	3,641	(——)	1901
2½″	Steel pipe...	66,053	(——)	1901
2″	Steel pipe...	649,459	(——)	1889

No. of manholes.	*Size.*
2153	3′ 6″ x 5′ x 5′ deep.
198	2′ x 2′ x 2′ deep.

(*b*) Cables and wires—Total length of streets served (——) miles.

Kind of insulation.	*Size.*	*No. feet.*	*Voltage.*	*Av. date installed.*
Lead covered-rubber insulated........	No. 6 B. & S.	1,754,243	10,000	1900
"	No. 2/0 B. & S.	13,557	6,600	1905

Detroit.

(*a*) Subways.

Type.	*No. of duct feet.*	*No. of trench feet.*	*Date installed.*
3½″ Vitrified clay......	334,641	51,758	Av. 1900
Brick tunnel 6′ 2″ x 3′ 6″	231	231	"
" " 5′ x 3′	96	96	"
2½″ lap welded pipe.....	65,699	65,699	"

No. of manholes.	*Size.*
169	5′ x 6′ x 6′ deep.
428	3′ x 3′ x3′ 6″ deep.

(*b*) Cables and wires—Total length of streets served, 25 miles.

Kind of insulation.	*Size.*	*No. feet.*	*Voltage.*	*Date installed.*
Single conductor, lead covered.............	No.6	133,580	6,000	Av. 1900
Single conductor, lead covered.............	No.4	144,731	6,000	"
Duplex, lead covered....	No.3	12,500	6,000	"
Single conductor, lead covered.............	No.8	26,385	2,300	"
Single conductor, lead covered.............	No.8	4,000	2,300	"
Single conductor, lead covered.............	No.4	38,799	2,300	"
Single conductor, lead covered.............	No.0	3,000	2,300	"

(Insulation principally rubber.)

South Norwalk.

(*a*) Subways.

None.

(*b*) Cables and wires—Total length of streets served (——) miles.

Kind and Insulation.	*Size.*	*No. Feet.*	*Voltage.*	*Date Installed.*
Submarine rubber, jute, armored..	Twin 4/0	800	250	Half in 1898
	Twin No. 6	400	250	Half in 1905

None in streets.

H 12. Overhead lines.

Allegheny.

(*a*) Poles.

No record kept of poles owned. After some discussion of his recollections superintendent estimated about as follows:

No.	*Kind.*	*Size.*	*How set.*	*Average date set.*
3100	Cedar.	40′.	Dirt.	———

A private company has entered the field within five years and set many poles of which the city has the use.

(*b*) Wires—Total length of streets served (——) miles.

No. 6 T. B. W. P—1,330,000 feet (E).

Chicago.

(*a*) Poles.

No.	*Kind.*	*Size.*	*How set.*	*Average date set.*
7378	Cedar.	25′—50′	Earth.	1901
835	Iron.	25′—30′	Concrete.	1902

(*b*) Wires—Total length of streets served (——) miles.

Kind and Insulation	*Size.*	*No. feet.*	*Voltage.*	*Average date Strung.*
Triple Braid W. P....	No. 6	3,584,428	10,000	1901
" " "	No. 2/0	28,880	6,600	1905

Detroit.

(*a*) Poles.

No.	*Red cedar.*	*Pine.*	*Size.*	*How set.*	*Average date set.*
7166	13	17	35	....	4378 in 1898 and 300—350 per year since.
	4,693	0	40		
	1,206	4	45		
	762	16	50		
	173	27	55		
	88	95	60		
	28	22	65		
	0	17	70		
	0	5	75		
Total.	6,963	203			

Also 544-18′ Guy stubs.
77-40′ Susp. poles.

(*b*) Wires—Total length of streets served, 525 miles.

Kind of insulation.	*Size.*	*No. feet.*	*Voltage.*	*Av. date strung.*
Solid triple braid..	No. 8	16,320	. 2,300	1898
" " "	No. 6	3,030,338	6,000	1900
" " "	No. 4	183,510	6,000	1904
" " "	No. 3	11,500	2,300	1899

(All weather proof insulation.)

South Norwalk.

(*a*) Poles—as reported by the Gen. Supt.

Approximate No.	*Size.*	*How Set.*	*Average Date Set.*
5	60 feet.[1]	All in dirt, except about one dozen in concrete.	(a) Owned by city. 100 in 1892. 100 in 1898. 100 in 1904. (b) One-third owned by city. 150 in 1904.
25	45 feet.[1]		
230	30-40 feet.[1]		
40	25 feet.[1]		
10	60 feet.[2]		
50	45 feet.[2]		
90	35 feet.[2]		

[1] Owned wholly by city.

[2] City has one-third ownership.

NOTE—All chestnut poles.

(*b*) Wires—Total length of streets served —— miles.

Kind and insulation.		*Size.*	*No. feet.*	*Voltage.*	*Av. date strung.*
T. B. W. P.	for arcs.	No. 6	58,080′	10,000	1892
Rubber.		No. 6	10,560′	10,000	1903

And for incandescent 250 V. T. B. W. P., as follows:

600′ of 1,000,000 C. M.	....	E	50% in 1898 30% in 1899-1904 20% in 1905
600 of 500,000 C. M.	6,400′ No. 3		
52,800′ of 4/0	32,600′ No. 6		
1,000′ of 3/0	5,200′ No. 8		
10,000′ of 2/0	7,600′ No. 10		
	15,000′ No. 12		

H 13. Arc lamps owned.

Allegheny.

	No.	*C. P. or watts.*	*Amperes.*	*Date.*
Brush double carbon	639	450	9.6	1895
Gen. Elec. D. C. Enclosed	933	450	6.6	1904

(*a*) Direct current.

Open	639.
Enclosed	933.

(*b*) Alternating.

Open	None.
Enclosed	None.

(*c*) All others.

Open	None.
Enclosed	None.

(*d*) Total.

Open	639.
Enclosed	933.

Chicago.

	No.	*C. P. or watts.*	*Amperes.*	*Date.*
West. Elec. Single Arm	269		9.6	Av. 1898
" Boulevard	436		9.6	
" Duplex	186		9.6	
" Double Arm	207		9.6	
Brush Double	111		9.6	
Brush Adams	182		9.6	
Brush Boulevard	325		9.6	
T-H. M. 2	307		9.6	
Standard (Gregory)	855		9.6	
Fort Wayne Single Arm	1419		9.6	
" Boulevard	162		9.6	
Fort Wayne D. C. Enc.	874		6.6	1902
Fort Wayne A. C. Enc.	495		7.0	1905
G. I., A. C. Enc.	857		7.0	1905
Fort Wayne Midget	20		7.0	1905
West. Elec. A. C. Enc.	823		7.0	1905

(*a*) Direct current.

Open	4,459.
Enclosed	874.

(*b*) Alternating.
Open.......... None.
Enclosed....... 2,195.
(*c*) All others.
Open.......... None.
Enclosed....... None.
(*d*) Total.
Open.......... 4,459.
Enclosed....... 3,069.

Detroit.

(Arc lamps owned, cont'd.)	*No.*			*C. P. or Watts.*		
Make.	*In use.*	*In stock.*	*Total.*		*Amps.*	*Date.*
Brush Open...........	1,178	94	1,272		9.6	1895
Gen. Elec. Series A. C..	287	10	297			1901
West. Elec. Series A. C..	1,540	42	1,582			1901
Gen. Elec. C. P. A. C..	9	3	12			1901
West. Elec. C. P. A. C..	8	2	10			1901
	3,022	151	3,173			

(*a*) Direct current.
Open.......... 1,272.
Enclosed....... None.
(*b*) Alternating.
Open.......... None.
Enclosed....... 1,801.
(*c*) All others.
Open.......... None.
Enclosed....... None.
(*d*) Total.
Open.......... 1,272.
Enclosed....... 1801.

South Norwalk.

(Arc lamps owned, cont'd.)	*No.*	*C. P. or Watts.*	*Amps.*	*Date.*
Fort Wayne Wood Enc. Single carbon D.C. Series	115	1400-350 @ terminals.	5	1903
Gen. Elec. Twin Carbon enc. D.C. Multiple, 220 V	67	605 at terminals	$2\frac{3}{4}$	1903-1906

Ditto operated but owned by users—10.

(*a*) Direct current.
Open.......... None.
Enclosed....... 182.
(*b*) Alternating.
Open.......... None.
Enclosed....... None.
(*c*) All others.
Open.......... None.
Enclosed....... None.
(*d*) Total.
Open.......... None.
Enclosed....... 182.

H 14. Incandescent lamps in use.

Allegheny. 9,032 16 C. P., and 658 32 C. P.

Chicago. Incandescent lamps owned. None.

Detroit. Incandescent lamps owned—in stock.
No. 16 C. P. or watts, 2,792.

South Norwalk. Incandescent lamps owned—

	No.	*C. P.*	*Watts.*
450 in stock	2,350	8	39
7,255 installed	4,500	16	60.8
	850	64	120

H 15. Motors owned.

Allegheny.	*No.*	*A.C. or D.C.*	*H.P.*	*Volt.*	*Date.*	*Total H.P.*
	1	A.C.	10	104	1902	10
	1	A.C.	15	104	1902	15
	1	D.C.	10	110	1903	10
	1	D.C.	15	110	1903	15

Chicago. None except two driving auxiliaries included in H 26.

Detroit. Motors owned.

No.	*A. C. or D.C.*	*H.P.*	*Voltage.*	*Date.*	*Total H.P.*
2	A.C. 2-phase.	5	110	1903	10

South Norwalk. None except in station. See H 8. (*d*).

H 16. Meters.

Allegheny.

No.	*A.C. or D.C.*	*Type.*	*Watts.*	*Total K. W. Capacity.*
1	A.C.	Polyphase.	120	Amp. on Switch Board.
2	A.C.	Polyphase.	200	Amp. on Switch Board.

Chicago. Included in H 27. On Switch Board only.

Detroit. Meters.

No.	*A. C. or D. C.*	*Type.*	*V-Amperes.*	*Date.*	*Total K. W. Cap'y.*
2	a	Stanley	110V-500A	Mostly since 1902	
6	1	Thompson	110V-100A		
20	1.	"	110V- 50A		
2		"	110V- 25A		
1	A. C.	"	110V- 15A		
1		Stanley	110V- 50A		

South Norwalk. All Thomson recording watt meters D. C. 220 V.

No.	*A.C. or D.C.*			
3	3 ampere	21-25 amp.		and on Switch Board.
329	5 "	20-50 amp.		1— 300 amp.
47	10 "	2-75 amp.		2— 600 amp.
23	15 "	1-100 amp.		1—1,200 amp.
				450 Total.

H 17. Transformers—line.

Allegheny.

No.	*Lamp or K. W. Capacity.*	*Type.*	*Voltage.*	*Total K. W. Capacity.*
2	25 K. W.	O. D.	2,200	305
1	11 K. W.	O. D.	2,200	
11	10 K. W.	O. D.	2,200	
5	7½ K. W.	O. D.	2,200	
5	5 K. W.	O. D.	2,200	
1	4 K. W.	O. D.	2,200	
1	3½ K. W.	O. D.	2,200	
1	3 K. W.	O. D.	2,200	
7	2½ K. W.	O. D.	2,200	
17	2 K. W.	O. D.	2,200	
3	1½ K. W.	O. D.	2,200	
4	1 K. W.	O. D.	2,200	

Chicago. None.

Detroit. All 2,200 V. primary. Purchased all since 1898 and mostly since 1902.

No.	Type.
2—75 K. W.	Pittsburgh.
2—30 K. W.	Lakon.
2—25 K. W.	West.
1—20 K. W.	Pittsburgh.
6—15 K. W.	5 West.—1 Stanley.
4—10 K. W.	2 West.—2 Pittsburgh.
5— 7½ K. W.	Fort Wayne.
27— 5 K. W.	8 C. E.—1 Packard. 10 West.—8 Am.
4— 4 K. W.	1 West.—1 Lakon—2 G. E.
13— 3 K. W.	6 West.—2 Pittsburgh—3 Am. 2 G. E.
1— 2½ K. W.	
2— 2 K. W.	
39— 1½ K. W.	
Total....700—½ K. W.	

South Norwalk. None.

H 18. Other appliances, number and kinds.

Allegheny. None.

Chicago. None.

Detroit. Arc light regulators 6.8 amperes.
15-75 light Western Electric.
17-60 light Western Electric.
1- 6 light General Electric.

South Norwalk. 400 Bryant service fused switch boxes.

APPRAISAL OF PLANTS.

Allegheny.

H 19. As of date (end of fiscal year) February 28, 1905.

H 20.	Land	E.	$10,000 00
H 21.	Buildings	E.	31,500 00
H 22.	Steam engines		28,935 37

H 23.	Boilers, stacks and furnaces		$27,599 25
H 24.	Water power plant		None
H 25.	Gas engines		None
H 26.	Auxiliary apparatus		19,931 10
H 27.	Dynamos, switchboards and wiring		48,468 80
H 28.	Storage batteries		None
H 29.	Transformers		4,650 00
	(*a*) Station	$885 36	
	(*b*) Line	3,764 64	
H 30.	Lines		50,101 82
	(*a*) Underground	None	
	(*b*) Overhead	$50,101 82	
H 31.	Arc lamps		27,320 39
H 32.	Incandescent lamps		None
H 33.	Motors		9,231 60
H 34.	Meters		285 60
H 35.	Other appliances. Included elsewhere		......
H 36.	Teams, tools and other accessories		630 00
H 37.	Total appraised value		$258,656 93

The property (except land and buildings) is appraised at present cost to replace less a deduction for age and progress of the art. The appraisal values are for property as it was constructed and operated February 28, 1905. We could not ascertain the cost of land, and we had no authority to employ a local real estate expert to estimate the present value, so to fill out the present schedule we have assumed land at $10,000, which we think is probably more than its value. We could not ascertain cost of building, and we had no authority to employ a local building expert to estimate its present value, so to fill out the schedule we have assumed $31,500, which we think is about right, considering its age and condition.

Chicago. Appraisal of Plant.

H 19. As of date (end of fiscal year) December 31, 1905.

H 20.	Land		$49,501.84
H 21.	Buildings		88,793.98
H 22.	Steam engines		72,067.80
H 23.	Boilers with stack, furnaces and superheaters		95,893.14
H 24.	Water power plant. None.		
H 25.	Gas engines. None.		
H 26.	Auxiliary apparatus		45,779.83
H 27.	Dynamos, switch boards and wiring		69,687.45
H 28.	Storage batteries. None.		
H 29.	Transformers included in H 31.		
	(*a*) Station.		
	(*b*) Line. None.		
H 30.	Lines		762,339.11
	(*a*) Underground	$613,913.86	
	(*b*) Overhead	148,425.25	

H 31.	Arc lamps, regulators and suspensions........	$95,358.75
H 32.	Incandescent lamps. None.	
H 33.	Motors—two driving auxiliaries, included in H 26.	
H 34.	Meters—only on switch board, included in H 27.	
H 35.	Other appliances—included elsewhere.	
H 36.	Teams, tools and accessories..............	3,150.00
H 37.	Total appraised value....................	$1,282,571.90
	Construction material on hand not included above	$32,635.28

The property except land and buildings is appraised at present cost to replace less a deduction for age and progress of the art. The appraised values are for the property as it was constructed and operated December 31, 1905. The land purchased by electric lighting appropriations and used by the department of electricity is appraised:

Rice and Lincoln streets...........	$19,000.00
299 South Halsted street..........	30,501.84
	$49,501.84

For additional land at 299 South Halsted street, used by the department of electricity but not owned by the city, the department pays an annual rental of $2,500. The appraised value of other land owned by the city but not purchased with electric lighting appropriations is:

Wentworth avenue.............................	$11,400
Fullerton avenue..............................	$13,000
Chicago and Sedgwick streets {lamp repair shop}	$20,000

The buildings used by the department of electricity and built by electric lighting appropriations cost $113,299.99; and without employing any local building expert (for which we did not have authority), we have based a present value on the original cost, less a deduction for age and condition, of $83,543.98; and for a building on Indiana avenue built by an electric lighting appropriation but used by another department for repairs and storage, we have put a value of $5,250, a total of $88,793.98.

Detroit. Appraisal of plant (fixed assets only).

H 19.	As of date (end of fiscal year) June 30, 1905.	
H 20.	Land at cost...........................	$63.125.00
H 21.	Buildings and wharf....................	79,755.70
H 22.	Steam engines..........................	48,389.25
H 23.	Boilers, furnaces and stack................	16,445.62
H 24.	Water power plant. None.	
H 25.	Gas engines. None.	
H 26.	Auxiliary apparatus.....................	19,118.61
H 27.	Dynamos, switchboard and wiring.........	36,497.24

H 28.	Storage batteries for testing		$264.60
H 29.	Transformers		15,286.19
	(*a*) Station	$8,621.55	
	(*b*) Line	6,664.64	
H 30.	Lines.		
	(*a*) Underground	$212,148.27	
	(*b*) Overhead	197,060.04	
			409,208.31
H 31.	Arc lamps, transformers, regulators and suspensions		50,628.71
H 32.	Incandescent lamps		1,836.24
H 33.	Motors (except in shop)		420.00
H 34.	Meters		2,501.10
H 35.	Other appliances		3,931.95
H 36.	Teams, tools and other accessories		4,318.78
H 37.	Total appraised value		$751,727.30

The property except land and buildings is appraised at present cost to replace, less a deduction for age and progress of art. The appraisal values are for the property as it was constructed and operated June 30, 1905. The land and buildings are minor parts of the whole cost. We have entered the land at its actual cost and the buildings at actual cost, less a deduction for age and condition. To ascertain present value of land and present cost to duplicate buildings would have required the securement of local experts for which we did not have authority.

South Norwalk. Appraisal of plant.

H 19.	As of date (end of fiscal year) January 1, 1906.		
H 20.	Land (*a*) plant, (*b*) offices		$2,000.00 (E)
H 21.	Buildings (*a*) plant, (*b*) offices		5,750.00 (E)
H 22.	Steam engines		6,898.50
H 23.	Boilers and stack		3,753.75
H 24.	Water power plant		
H 25.	Oil engines (Diesel)		15,960.00
H 26.	Auxiliary apparatus		3,241.87
H 27.	Dynamos, switchboard and wiring		13,510.87
H 28.	Storage batteries. None		
H 29.	Transformers. None.		
H 30.	Lines: (*a*) submarine	$574.77	
	(*b*) overhead	16,344.85	
			16,919.62
H 31.	Arc lamps and suspensions		3,201.57
H 32.	Incandescent lamps		859.68
H 33.	Motors		1,280.47
H 34.	Meters		8,793.30
H 35.	Other appliances.		
H 36.	Teams, tools and other accessories		420.00
H 37.	Total appraised value		$82,589.63

The property, except the land and buildings, is appraised at present cost to replace, less a deduction for age and progress of art. The appraisal values are for the property as it was constructed and operated February 28, 1905. The land and buildings (14 years old) cost $10,391.67. To get an opinion on present values would have involved securing local experts for which we did not have authority. To complete the schedule we have assumed land, $2,000; buildings, $5,500. Total, $7,500.

CONSUMPTION.

Allegheny.

H 38. Total number of services. All in public buildings, 51.
H 39. Total number of services metered. None.
H 40. Percentage of services metered. Meters at station switchboard only.
H 41. Total current delivered at switchboard during year, 3,972,959 K. W. H. (E).
(*a*) Alternating current 1,081,900 K. W. H. (E).
(*b*) Direct current. Assumed 500 watts per lamp hour, 2,891,059 K. W. H. (E).
H 42. Total current bought during the year. None.
H 43. Total current to be accounted for. None.
H 44. Current sold during year. None.
H 45. Current used at works and offices. Not measured.
H 46. Current supplied free. ———
H 47. Current unaccounted for. ———
H 48. Total, 3,972,959 K. W. hours (E).
H 49-57. None.
H 58. Maximum daily output:

January 6, 1905	A.C. K.W.H.	4,700
December 15, 1904	D.C. K.W.H.	10,035
Total		14,735

H 59. Minimum daily output:

July 3, 1904	A.C. K.W.H.	1,300
June 29, 1904	D.C. K.W.H.	5,599
		6,899

H 60. Average output per hour for each hour of the day.
(*a*) Maximum day. (——)
(*b*) Minimum day. (——)
H 61. Number of consumers who used commercial arc lights. None.
H 62. Number of consumers who used incandescent lights. None.

Note. It will be observed that nearly three-fourths of given output is arrived at by *assuming* 500 watts supplied to each arc lamp.

H 63. Number of consumers who used electric power and total connected horse power. None.
H 64. Total number of different consumers. No private consumers.

H 65. Arc lamps in use. Commercial services. None.

H 66. Arc lamps in use—public lighting. 1,522.

(*a*) Direct current:

	No.	*Amperes.*	*Hours of service rendered per year.*
Open	615	9.6	3,888
Enclosed	907	6.6	3,888

(*b*) Alternating current. None.

(*c*) All other. None.

(*d*) Total. Open, 615; enclosed, 907.

H 67. Incandescent lamps connected—public and private.

No.	*Direct current.*	*Alternating current*	*Candle power or watts.*
	None............	9,032	16 candle power
	None............	658	32 candle power

Chicago.

H 38 to H 62 inclusive.

Entire output used for series arc lighting only.

No part of output is metered, except the A. C. service, and that for only part of the year 1905.

H 63, 64, 65. None.

H 66. Arc lamps in use—public lighting. In May, 1906.

(*a*) Direct current.

		Amperes.	*Hours of service rendered per year.*
Open.......	4,180	9.6	4,015
Enclosed....	864	6.8	4,015

(*b*) Alternating current.

Open. None. Enclosed, 1,778. Amperes, 68.

(*c*) All other. None.

(*d*) Total. Open, 4,180; enclosed, 2,642.

H 67. Incandescent lamps conected—public and private.

Incandescent lamps are operated in city during business hours by Edison company. A small alternator of about 100 light capacity furnishes current for these incandescents at night time.

Detroit.

H 38. Total number of services (to public buildings), 132.

H 39. Total number of services metered. Four separately and altogether at station.

H 40. Percentage of services metered. Altogether 100 per cent.

H 41. Total current delivered at switchboard during year, 5,884,541 K. W. hours. Alternating current and direct current not separated.

H 42. No current bought.

H 43. Total current to be accounted for ———.

H 44. Current sold during year, 131,428 K. W. H.

H 45. Current used at works and offices. Not metered.

H 46. Current supplied free. (No commercial business except boat club.)

H 47. Current unaccounted for ———.

H 48. Total ———.
H 49. Current sold for private arc lights, unmetered. None sold.
H 50. Current sold for private incandescent lamps, unmetered. None sold.
H 51. Current sold for private lighting, metered. 131,428 K. W. H.
H 52-56. ———.
H 57. Total current sold, 131,428 K. W. hours.
H 58. Maximum daily output and date.
December 14, 1904. 21,429 K. W. hours.
H 59. Minimum daily output and date.
July 3, 1904. 10,106 K. W. hours.
H 60. Average output per hour for each hour of the day.
(*a*) Maximum day (——).
(*b*) Minimum day (——).
H 61. Number of consumers who used commercial arc lights. None.
H 62. Number of consumers who used incandescent lights. 8.

Station switchboard output for street arcs D. C. and A. C. current, 4,780,397 K. W. hours.

For indoor incandescents and power, A. C. only. 1,104,144 K. W. hours.

Total, 5,884,541 K. W. hours.

H 63. Number of consumers who used electric power and total connected horse power. None.
H 64. Total number of different consumers. 8.
H 65. Arc lamps in use—commercial service. None.
H 66. Arc lamps in use—public lighting:
(*a*) Direct current.

Open. *No.*	*Candle power.*	*Amperes.*	*Hours of service rendered per year.*
1,177	2,000	9.6 Operated at 9.2 amperes after 9:30 P. M.	3,774 5/6
Enclosed.			
		6.8	

(*b*) Alternating current:

Open. None.

Enclosed. 287 General Electric 6.8 amperes, operated 3,774 5/6 hours, operated 6.4 amperes after 9:30 P. M.

1,540 Western Electric, 6.8 amperes, 3,774 5/6 hours, operated 6.2 amperes after 9:30 P. M.

(*c*) All other.

Open. None.

Enclosed. 10 General Electric Multiple, 5 amperes.

10 Western Electric Multiple, 5 amperes.

(*d*) Total. Open, 1,177 series street.

Enclosed, 1,828 series street.

20 Multiple indoors.

H 67. Incandescent lamps connected—public and private.
Alternating current, 14,696. 50 watts (nearly all).
Total watt capacity. 738,800.

South Norwalk.

H 38. Total number of services, 430.
H 39. Total number of services metered, 409.
H 40. Percentage of services metered, 95.12.
H 41. Total current delivered at switchboard during year, 734,644 K. W. H.
(*a*) Alternating current. None.
(*b*) Direct current. 734,644 K. W. H.
H 42. Total current bought during year. None.
H 43. Total current to be accounted for. 734,644 K. W. hours.
H 44. Current sold during year. ———.
H 45. Current used at the works and offices. 7,000 K. W. hours.
H 46. Current supplied free. 1,000 K. W. hours. (E.)
H 47, 48, 49, 50.

		K. W. H.
H 51, 52, 53, 54, 55. Generator output at 250 V., D. C., total annual		734,644
	K. W. H.	
(*a*) Supplied to motor generator for street arcs	126,080	
(*b*) Supplied for station lighting	7,000 (E)	
		133,080
	K. W. H.	
Supplied outside station	601,564	
Copper loss in distribution	25,000 (E)	
Supplied to users		576,564
Free current for four pilot lights in commissioner's houses		1,000 (E)
Total sold (exclusive street arcs)		575,564
Sold to public buildings (city pays plant)		25,000 (E)
Sold to private users		550,564
Street arc lighting—		
Supplied motor generator as above		126,080
Delivered at generator terminals for street conduits		103,000 (E)
H 56. Current sold for street railway power		None
H 57. Total current sold		678,564

H 58. Maximum daily output and date. December 22, 1905, 4,024 K. W. hours.
H 59. Minimum daily output and date. May 28, 1905. 960 K. W. hours.
H 60. Average output per hour for each hour of the day.
(*a*) Maximum day, December 22, 1905.
(*b*) Minimum day, May 28, 1905.

Ampere Load Record.

	Amperes											
Hours P. M.	1	2	3	4	5	6	7	8	9	10	11	12
Dec. 22.	500	500	660	734	1,500	1,250	1,105	1,150	1,090	895	570	410
noon, amp.	80											
May 28—0	...	...	...	...	....	70	120	255	440	400	330	300

	Amperes											
Hours A. M.	1	2	3	4	5	6	7	8	9	10	11	12
Dec. 23...	390	385	371	370	390	500	775	825	760	745	745	270
May 29...	290	100	95	95	60	40	250	330	330	350	320	45

H 61. Number of consumers who used commercial arc lights. 34.

H 62. Number of consumers who used incandescent lights. 378.

H 63. Number of consumers who used electric power and total connected horse power. Number, 52; total horse power, 598.

H 64. Total number of different consumers, 430.

H 65. Arc lamps in use—commercial service.

(*a*) Direct current.

Open. None.

Enclosed. 77.

Candle power 1,200, 2¾ amperes, metered at 10 cents—6 cents. See report, page 21, Thirteenth Annual Report.

(*b*) Alternating current. None.

(*c*) All other. None.

(*d*) Total. Open, none. Enclosed, 77.

H 66. Arc lamps in use—public lighting.

(*a*) Direct current.

Open. None.

Enclosed. 109.

Candle power 1,400. Amperes 5, hours of service rendered per year, 2,883. (See answer to question H 89.)

(*b*) Alternating current. None.

(*c*) All other. None.

(*d*) Total. Open, none. Enclosed, 109.

H 67. Incandescent lamps connected—public and private.

Number Direct Current.	*Alternating Current.*	*Candle Power or Watts.*	*Total Watt Capacity.*
2,150 (E)	None....	8 candle power or 39 watts	83,850
4,300 (E)	None....	16 candle power or 60.8 watts	261,440
800 (E)	None....	120 watts Meridan lamp......	96,000
			341,290

H 68. Does the company or department own all the underground conduits it uses?

Allegheny. None used.

South Norwalk. None used.

Chicago. Yes.

Detroit. No.

H 69. If it rents any, state total length, rental, amount of rental, and by whom they are owned.

Allegheny, Chicago and *South Norwalk*. None rented.

Detroit. 1,744 duct feet, owned by Detroit Edison company, is rented, per year:

For one duct, at 5c. per foot,
For two duct, at 9c. per foot,
For three duct, at 12c. per foot.

H 70. Estimated population January 1, 1906, on lines; that is, supplied by mains (consumers).

Allegheny, Detroit. No private consumers.

Chicago. ———

South Norwalk. 8,000.

H 71. Annual average consumption per capita on basis of inquiry H 70.

Allegheny, Chicago and *Detroit*. No commercial business.

South Norwalk. 69 K. W. H.

H 72. Population at last national census of area supplied.

Allegheny. 129,896.

Chicago. 1,698,575.

Detroit. 285,704; area of city, 27½ sq. miles. Miles of paved streets, 310½ miles.

South Norwalk. 6,591.

H 73. Annual average consumption per capita on basis of inquiry H 72.

Allegheny, Chicago, Detroit. ———

South Norwalk. 83.5 K. W. H.

H 74. Are consumer's meters removed and tested at regular intervals? How often?

Allegheny. No consumer's meters.

Chicago. No commercial business.

Detroit. No private consumers except Boat Club located in Belle Isle (public park).

South Norwalk. Not tested at regular intervals, but tested when they believe necessary.

Questions H 75 to H 81, inclusive, do not apply to Allegheny, Chicago and Detroit, as they have no commercial business.

H 75. If consumer believes that meter is fast, how may he have it tested?

South Norwalk. By making complaint.

H 76. Are there records of proofs of meters as removed? If so, state them.

South Norwalk. A card-index record is kept of each meter giving the number, place where located, date of installation, dates of various tests made and results of such tests.

H 77. What means are being taken to extend the use of electricity?

South Norwalk. General superintendent does the soliciting for the plant; wiring contractors solicit wiring.

H 78. Are consumers instructed in the use of lighting appliances?

South Norwalk. No organized method.

H 79. What means are being taken to extend the use of electrical appliances?

South Norwalk. No particular means.

H 80. Are electrical appliances carried in stock for sale or rent?

South Norwalk. No, except incandescent lamp renewals, which are furnished free to consumers.

H 81. What special methods are in use to secure new users?

South Norwalk. No special methods. See answer to H 77.

CHARACTER OF SERVICE.

H 82. State fully the methods of testing current regulation and character of service.

Allegheny. Arc current measured by switchboard am-meters, Circuits are tested for ground during the day with a magneto, and at night while in service are tested by a Weston station volt-meter. Incandescent services are measured by switchboard am-meters and volt-meters.

Chicago. 10 switchboards have the usual am-meters. Tests made at least daily for arc light grounds. Am-meters at Halstead street were calibrated and found correct within about 15/100 amperes.

Detroit. There is one electrician and one switchboard tender on each watch of eight hours each. Ampere and volt-meter readings taken at intervals of ½ hour and recorded. The current is maintained as follows: Direct current open arc circuit, 9.6 amperes to 9:30 P. M., then cut down to 9.2 amperes to the end of the run. A. C. enclosed circuits, 6.8 amperes to 9:30 P. M., then cut to 6.3 amperes average to end of run. During the hours of lighting the voltage of each circuit can be measured by a Weston station volt-meter on the arc switchboard. The ampere meters in the arc-circuit are calibrated each night by a Weston station ammeter, located on the arc-board.

Regulation of A. C. circuits is by hand at the central station and by constant current transformers and arc-light regulators on each circuit, both at the central and sub-stations. The insulation of arc circuits is measured at 8 A. M., 1 P. M., and hourly thereafter until lamps are lighted, by a testing-storage battery and volt-meter. After circuits are lighted, grounds are located by a series of incandescent lamps which can be connected across dynamo terminals, and these lamps are connected successively to a commutator. A ground connection passed over a commutator causes uneven candle power of lamps at each side until ground connection reaches segment corresponding to position of ground.

South Norwalk. Ordinary methods used for detecting grounds, but not the location of grounds. Arc current measured on switchboard am-meter. Distribution of commercial service is from three centres of distribution, served by separate feeders. Pressure wires are brought back from each centre of distribution to the switchboard, so that drop in pressure at any time may be ascertained.

H 83. Summarize results of such examination.

Allegheny. No records of testing.

Chicago. Ammeters at South Halsted calibrated, found correct within .15 amperes—had been repaired the preceding year.

Detroit. The maintenance of the current in arc circuits is claimed to be uniform at the values given in H 82 for the particular hours.

South Norwalk. Regulation both by hand and over-compounding of generators. Two hundred and twenty-volt incandescent lamps used. Voltage maintained at centres of distribution from a minimum of 225 to a maximum of 235 volts, according to load on feeders, and in an effort to maintain from 221 to 223 volts at the lamp. Bus voltage is varied from 230 volts at minimum load of 70 amperes to 265 volts at maximum load of 1,500 amperes.

H 84. Attach form on which tests are recorded.

Form said to be attached for each of the four schedules.

H 85. Were outages frequent?

Allegheny. In December, 1905, the "dark hours" reported were 1483. Dark Lamp Hours equal ¼ per cent.

Chicago. Unable to give any actual figures in percentage of outages. In explanation see H 86.

Detroit. Reported under 1/10 per cent. See 1905 annual report, page 31.

South Norwalk. General superintendent states to be ½ per cent. Patrol states about five per month out all night.

H 86. What system of inspection was used to see if all lamps were burning?

Allegheny. Police report outages; also three inspectors patrol circuits, reporting hourly through police telephone system.

Chicago. All outside lines and lamps are under the charge of the chief trimmer, under whom are 81 lamp trimmers, nine of whom act as patrolmen. Much dependence is put upon reports made by the police. The police reports are filed by the chief trimmer under the name of the police officer making the report, and are not classified by locations or tabulated or summarized in any form. It involves considerable labor to gather outages for any particular day. By personal observation, on one occasion, one entire arc lighting circuit was out from 10:25 to 10:38 P. M. and no record could be found that the outage was reported.

Detroit. Three (3) night patrolmen, each supplied with horse and buggy, reporting to station by 'phone every thirty minutes until 2:00 A. M., and one (1) day patrolman with horse and buggy. Police report to electrician on watch at station. Reports also by citizens by 'phone or through the mail. These reports are tabulated and kept on file at the office.

South Norwalk. The trimmers or linemen patrol circuit until nine o'clock. Police report outages. Outage postal cards furnished citizens.

H 87. State results of such inspection.

Allegheny. Results recorded in station log and inspector's report sheet.

Chicago. Answered under H 86.

Detroit. Answered under H 85.

South Norwalk. General superintendent states station gets prompt reports of outages. No casual troubles are remedied after nine o'clock.

H 88. Is service supplied twenty-four hours per day?

Allegheny. Yes, for incandescent service. Street arc service supplied from dark to daylight.

Chicago. No.

Detroit. Yes, for incandescent lights. For street arcs, thirty minutes after sunset to forty minutes before sunrise. (3,775 hours yearly.)

South Norwalk. Yes, except part of Sundays.

H 89. If for part only, how many hours each day?

Allegheny. Arc service, 10 hours 39 minutes. See answer to H 88.

Chicago. Street lighting service 4,015 hours yearly. Average 11 hours per day.

Detroit. Answered under H 88.

South Norwalk. For street arcs, one hour after sunset to one hour before sunrise, except during moonlight. For commercial service, 24 hours except part of Sundays. For street lighting, the motor generator was supplied with metered current 126,080 K. W. H. Deduct 18 per cent. for loss in motor generator, leaves 103,000 K. W. H. Deduct 5 per cent. for line loss, leaves at lamp terminals 97,850 K. W. H. Dividing by 109 lamps, gives per lamp per year 898 K. W. H. Divided by 375 watts per lamp gives the calculated hours of operation per year, 2,422.

H 90. Does voltage fluctuate? Furnish voltage charts.

Allegheny. No voltage charts. Hand regulation at switchboard.

Chicago. Series arc lighting only.

Detroit. Not much. See charts.

South Norwalk. As per H 83, bus voltage varies from 230 to 265 to compensate for feeder drop. Voltage at centres of distribution varies from 225 to 235, to compensate for drop in distribution net work. No record is had of the actual voltage at lamps. No recording volt-meters are used.

H 91. Are there any engineering tests or experiments being carried on?

Allegheny, Chicago, Detroit. No.

South Norwalk. Not at present. Economy tests have been made by engineering students.

H 92. Were there frequent complaints about interruptions in the service?

Allegheny. Not in position to know.

Chicago. Cannot be accurately answered.

Detroit. Probably not; we were not in position to hear them.

South Norwalk. No.

H 93. Has the electric lighting supply ever been cut off from the city? Describe instances.

Allegheny. Shut down June 18, 1903, 12:30 A. M. to 10:00 A. M., account fire. Has been only shut down, so superintendent states.

Chicago. There is no record indicating any shut down.

Detroit. Assistant superintendent states no interruptions to his knowledge within six years.

South Norwalk. Yes, in 1900 tornado shut plant down thirty minutes and wrecked a mile of overhead construction. In 1898 bad coal stopped the plant two hours.

EXTENSIONS.

H 94. What factors have determined the extent and location of extensions?

Allegheny. Area of city fixed by natural boundary. Original plant built covered practically the whole city. Only a few new streets opened. Increase of street lights in ten years 20 per cent.

Chicago. This is governed entirely by the ability of the city to provide the necessary funds.

Detroit. Street arc extensions determined by judgment of commissioners' "Extensions and Supply Committee," as to needs, subject to appropriations of the council.

South Norwalk. Built-up area already about covered. Location of several factories contributed largely to extension of lines for power service.

H 95. Is the built-up area well served, so that all citizens may use the service?

Allegheny. Streets in built-up area have liberal number of lights.

Chicago. There are 6,706 lights in operation as of December 31, 1905. The city electrician has prepared a map locating lamps to light all the streets of the city, and his estimate fixes the total number at 29,000, or about 22,000 additional lights. There were, on December 31, 1905, 24,604 gas lamps and 5,568 gasoline lamps in operation.

Detroit. No private users.

South Norwalk. Yes, in built-up area, about 8,000 feet by 5,000 feet. Whole area within the city limits four square miles.

H 96. Has the policy in respect to extensions been liberal?

Allegheny. Original number of lights ample. Few additions necessary.

Chicago. See answer to H 94.

Detroit.

Year...	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.
Number lights.	469	1,481	1,600	1,820	1,919	2,002	2,042	2,302	2,454	2,597	3,005

South Norwalk. The number of street lamps in service in 1894 was 98; in 1906 is 109.

H 97. Total length of extensions during the past year.

Allegheny. Twenty-four additional street lights added.

Chicago. During the year 1905, a new plant, located at Fullerton avenue and the Chicago river, was put into operation, having an equipment with a capacity for about 2,500 A. C. enclosed lamps, of which 1,778 were in operation on December 31, 1905. During the year 1905, an additional generating unit was ordered for this plant, which would bring the total capacity to about 3,500 or 3,700 lights. The extensions during the year 1905 were 160 miles of overhead wire, and 35 miles of underground cable, and 64,797 feet of street, of underground conduits.

Detroit. (—)

South Norwalk. Ten thousand feet.

H 98. Have the citizens of any section petitioned for extension to their district within the last five years?

Allegheny. No.

Chicago. Petitions are constantly being made. The lights petitioned for are being added or not at the discretion of the city electrician.

Detroit. For additional street lights wanted, the usual and ordinary procedure is said to be for the citizen to speak to his alderman; the alderman then introduces a resolution in council which is referred to the lighting commission and filed by the latter, which asks its assistant superintendent to report on the necessity for the light. If he reports favorably, and funds are available, and if there is spare capacity in station, then the extension and supply committee of the commission orders the lamp installed, or the committee has power to install lamps elsewhere than petitioned if it deems best. Or sometimes a number of petitions accumulate, and finally a number of lamps are installed simultaneously. There are 3,005 lamps to 550 miles of street, or about 5½ lamps per mile.

South Norwalk. For street lighting extension, about one petition made to city council per year. For commercial lighting, service now extends over from ten to twelve miles of street out of a total of seventeen and three-quarter miles.

H 99. As between several sections petitioning at one time, how were extensions determined and in what order?

H 100. Were extensions made promptly when there was a demand?

H 101. Was every applicant for service able to get it promptly?

Allegheny. Has had no petitions made and renders no commercial service.

Chicago. See answer to H 98. No commercial service.

Detroit. See answer to H 98. No private service.

South Norwalk. The city is compact. No controversy on this matter. Extensions made promptly if plant is not overloaded, and every applicant served promptly when station capacity was available.

H 102. Has the necessity for passage of an ordinance ever caused delay in extension of service?

Allegheny. No commercial business.

Chicago. Passage of an ordinance is necessary to secure the funds for making extensions, which are determined by the city electrician. During 1905 there was appropriated and expended for construction as follows:

Underground construction on streets to be improved.	$100,000 00
Extensions of municipal lighting system...........	257,036 83

Detroit. General annual appropriation by council determines funds available for the ensuing year for extensions.

South Norwalk. No ordinance necessary to make extensions. Ordinary extensions are paid for out of earnings. Funds for "enlargements" are borrowed on notes as authorized by the council.

H 103. Has the service been extended in advance of the demand in order to stimulate growth of a district, or has it awaited demand?

Allegheny. Superintendent states that streets are lighted as soon as opened and graded.

Chicago. Extensions of electric street lighting service principally supplant the present gas lighting system.

Detroit. No private users.

South Norwalk. The built-up area is about 8,000 feet by 5,000 feet. Already pretty well covered, and no new districts.

H 104. Was the department free to use its judgment about extensions, or was an ordinance required authorizing the extensions?

Allegheny. Yes, within amount of appropriation for street lighting.

Chicago. Answered under H 102.

Detroit. Decided by extension and supply committee of the commission, subject to general appropriations of the council.

South Norwalk. Additional lines are run at the discretion of the general superintendent.

H 105. May service be extended to suburban sections not within the city limits? State fully conditions upon which this may be done.

Allegheny. No; limited to city.

Chicago. No.

Detroit. No, except to public parks outside the city if owned by the city.

South Norwalk. No, but five such customers have built up to city limits to take city current.

STREET WORK.

H 106. Was street work done by direct employment or by contract?

Allegheny. Direct employment. Street work limited to overhead construction. Highway department sometimes repaves without charge.

Chicago. Practically all work done by direct employment.

Detroit. Direct employment except conduit work.

South Norwalk. Direct employment.

H 107. Was the work done by contract properly inspected?

H 108. Was the work performed in an efficient manner?

Allegheny. (—)

Chicago. Could not be accurately answered.

Detroit. Have conduit inspector for the purpose. No means of knowing the efficiency of the work.

South Norwalk. No contract work done.

H 109. Was the street surface promptly restored after openings were made?

Allegheny. Only openings are in sidewalks for poles. No such work in progress during our inspection.

Chicago. Could not be accurately answered.

Detroit. No means of knowing.

South Norwalk. No underground work.

H 110. Was water used in puddling ditches?

H 111. Were open trenches and obstructions properly guarded?

H 112. How are sunken trenches taken care of?

Allegheny. No ditches, no trenches, no sunken trenches.

Chicago. Soil has been such that about one-third of the ditches have been back-filled by puddling. Trenches and obstructions properly guarded by barricades and lights by night. Sunken trenches repaired when notified by commissioner of public works.

Detroit. Conduits laid in shallow trenches about two feet deep, and one trench we saw open was properly guarded.

South Norwalk. No underground work.

H 113. What has been the policy in regard to improving the condition of street services prior to street paving or repairing?

Allegheny. No street service.

Chicago. In 1905, $100,000 was spent for this purpose. Underground work is done in advance of laying improved pavements.

Detroit. Electric conduit laid only in business streets in centre of city and already paved.

South Norwalk. No street service.

H 114. Is there an up-to-date map showing the location and nature of all street mains and fixtures?

Allegheny. Map of the city is maintained up to date in the office of the superintendent, which shows the location of lights and the boundaries of the several trimming districts.

Chicago. The city electrician has a separate map of each overhead and underground circuit showing the run of the lines and location of the lamps. These are bound in book form, each book being all the circuits operated from one station.

Detroit. Map furnished, but not reproduced.

South Norwalk. No, but one is being made.

H 115. Who decides where underground structures shall be located in the street?

Allegheny. No underground structures.

Chicago. City electrician, under the direction of the commissioner of public works through the superintendent of streets.

Detroit. Assistant superintendent, subject to the commission's extension and supply committee.

South Norwalk. No underground structures.

H 116. Is a permit from a public authority required before street may be opened?

Allegheny. No.

Chicago. Yes.

Detroit. Commissioner of public works.

South Norwalk. No, but consults with street commissioner on important work.

H 117. Is a separate permit obtained for each opening?

Allegheny. No.

Chicago. Yes.

Detroit. For each street.

South Norwalk. No.

PURCHASE OF MATERIALS.

H 118. Who places the orders for materials, and who governs the placing of orders?

Allegheny. Electric superintendent makes requisition on direction (or?) of public works, who places order.

Chicago. If order amounts to less than $500, purchase is made by the business agent of the city, upon requisition of the city electrician. If over $500, by the city electrician, with the approval of the mayor.

Detroit. Superintendent or assistant superintendent makes requisition; extension and supply committee "approve"; Secretary orders.

South Norwalk. General superintendent.

H 119. Were contracts advertised?

Allegheny. Yes, for yearly supply of all anticipated items.

Chicago. Yes, if it amounts to over $500, an award must be made to the lowest responsible bidder by the city electrician, approved by committee on finance of the city council.

Detroit. No.

South Norwalk. No.

H 120. What system was used to check the quality of materials and weights or measurements of shipments?

Allegheny. Coal specifications provide that the coal delivered for lighting plant shall be mined from the Pittsburg thin vein, first or second pool, but do not provide for any requirements as to heating value, nor are any determinations made. Station employees complain that at times the coal contains much "dirt." The coal as specified is to be one-half nut and one-half slack. There is no organized system in vogue for checking quantity of materials. The chief operating engineer is depended upon for checking the quality and quantity of station supplies, while in the last four years very little construction work has been done outside the station.

Chicago. Station supplies and underground cable are delivered at Halsted Street station, where they are checked and inspected under the supervision of the chief operating engineer. Overhead construction material is delivered at Rice & Lincoln streets station, where it is checked and inspected under the supervision of the superintendent of construction. Lamps and lamp supplies are delivered at the lamp repair shop at Chicago avenue and Sedgwick street, where they are checked and inspected under the supervision of the chief trimmer. Coal is received at Fullerton avenue and Wentworth avenue plants by railroad weight. At Rice & Lincoln and Halsted street coal is weighed on station scales.

Detroit. Storekeeper counts and examines, except coal examined by station engineer, weighed on plant track scales, and paid for accordingly, and poles delivered to pole yard and examined by assistant superintendent.

South Norwalk. The general superintendent states (*a*) that coal is delivered by wagons and voucher given the engineer for each load. The load can be re-weighed on station floor scales and about twenty loads are so checked each year. (*b*) Supply shipments are counted and examined as received, by some employee, usually the inspector. About one incandescent lamp in ten is photo-metered.

H 121. What redress is there in case of shortages or poor quality of shipments?

Allegheny. The right is reserved to reject material which is inferior to the specified requirements, examinations being veinal(?). In the event of shortages, deductions are made from the bills *pro rata.*

Chicago. City electrician states that he requires all shortages in quantity to be made good, and that materials of poor quality are rejected.

Detroit. If coal is poor or short, price is scaled. If other supplies deficient, would reject.

South Norwalk. Ordinary redress, nothing special.

H 122. How did prices and quality compare with those paid by private companies?

Allegheny. See schedule of contract prices submitted under separate cover. (Not reproduced here.)

Chicago. The following prices were paid in 1905:

Oak Side Brackets	1.2c.	ea.
Mch. Bolts ½ x 4"	1c.	ea.
½ x 6"	2c.	ea.
½ x 16"	3c.	ea.
½ x 20"	3½c.	ea.
½ x 24"	4c.	ea.
Brooklyn Strain Insulators	67½c.	ea.
Sulphur	2½c.	
No. 6 McIntire Connectors	3c.	
2-pin cross arms	12c.	ea.
4-pin cross arms	16c.	ea.
6-pin cross arms	24c.	ea.
10-pin cross arms	30c.	ea.
Chatterton's Compound	$1.22½	per lb.
Glass Insulators T. P. small	4½c.	ea.
" " large	5½c.	ea.
Lumber	$30.00	per M.
Nails, all sizes	4c.	per lb.

Locust pins 1¼″	1c.	ea.
Locust pins 1½″	1½c.	ea.
W. U. Steel pins	3½c.	ea.
Bar Solder	19c.	per lb.
Wire Solder	22½c.	per lb.
Standard Risers	88c.	
Crushed Stone	$1.60	
Crescent Solder Stick	10c.	
Nauser Tape	21c.	per lb.
Okonite Tape	70c.	per lb.
⅜″ Iron Strand	1c.	a foot.
No. 6 Wrapped Wire	16⅝c.	per lb.
No. 10 H. D	17¾c.	per lb.
No. 10 wp	20 1/10c.	per lb.
No. 12 R. C	1 3/25c.	a foot.
No. 14 R. C	1c.	a foot.
No. 16 R. C	8/10c.	per foot.
No. 10 Soft Tie	20¾c.	per foot.
Iron, all sizes	3c.	a foot.

Detroit. (—)

South Norwalk. Schedule furnished, but not reproduced.

H 123. Were the dealers supplying materials connected with the city, county or state government?

Allegheny. Superintendent states no.

Chicago. City electrician states no.

Detroit. No, except in minor purchases if prices lowest.

South Norwalk. General superintendent states no.

H 124. Were local dealers favored over those outside of the city?

Allegheny. Yes, system of ordering under annual contracts favorable to local dealers.

Chicago. City electrician states 'Yes', everything being equal.'

Detroit. Yes, if other conditions favorable.

South Norwalk. Yes, for coal, tools and hardware when procurable at same prices.

H 125. Was there delay in placing orders after engineer or superintendent expressed the necessity for the supplies?

Allegheny. No. Superintendent orders by telephone if necessary, and confirmation follows later through the usual channels.

Chicago. Orders placed directly by city electrician upon requisition of head of department.

Detroit. No.

South Norwalk. Superintendent does his own ordering.

H 126. In practice, did the manager get the types and makes of the things asked for, or was he forced to take something else?

Allegheny. Yes.

Chicago. City electrician, chief operating engineer and chief trimmer state "Yes."

Detroit. Yes.

South Norwalk. He places his own orders.

H 127. Were bills for materials purchased paid promptly?

Allegheny. On the 15th of the following month.

Chicago. No; accounts are generally in arrears two or three months.

Detroit. Usually on the 20th of the following month or earlier if substantial discount procurable.

South Norwalk. Yes, on the Saturday nearest the 10th of the following month.

CONDITION OF PLANTS.

H 128. Is the plant adequately equipped to handle the business?

Allegheny. Yes, for 615 open arc lights and incandescent service; but for the 907 enclosed arc lights, the five engines without reserve are required all night and every night.

Chicago. Number of street lamps operated from the four plants has generally been limited by the station capacity. The station capacity is sufficient to handle the street lighting loads now existing. All stations, with the exception of the new plant at Fullerton avenue, are loaded to the economical limit.

Detroit. The open arc dynamo's capacity was 2,230 lights, and 1,177 operated. Alternating dynamo's capacity, 1,375 K. W.; operated 1,828 A. C. lamps, 738 K. W. of incandescent lamps connected. (Not all used simultaneously.) Boilers aggregate 2,000 H. P.

South Norwalk. Yes, but general superintendent expects plant will be fully loaded during Christmas, 1906, at time of peak load. He states further that load on plant is increasing at the rate of about 25 per cent. a year.

H 129. Is the equipment of modern and efficient type?

Allegheny. The boilers are water-tube, and of efficient type; two are equipped with Raxney stokers and one with Jones stokers. Steam piping is about one-half old (1895) and one-half new (1903). It has been re-arranged three times, and there is leakage at numerous joints over the boilers. Plant is non-condensing. The three horizontal cross compound engines aggregating 1,875 I. H. P. are nearly new, and are efficient of their type (Buckeye). There are five single-acting compound engines (belted), which are neither modern nor efficient—850 rated I. H. P. All electric apparatus within station, including switch-board, is of new and efficient type except twelve open-arc dynamos (Western Electric) which are now no longer manufactured.

Chicago. The boiler plant with stoking equipment, together with condensing plant and steam piping, is of modern and efficient type. All boilers are water-tube. The engine plant, with the exception of one unit, consists of cross compound vertical engines. These units are of fairly large size for stations carrying a street lighting load, being of an average of 900 I. H. P. each. The engines are run condensing, using the city supply for condensing water as well as for feed water, the discharge from the condensers being wasted. The A. C. generators at Fullerton avenue, together with the switch-board equipment and lamps, transformers and regulators operated from that plant, are new and of efficient type. The arc light machinery at Rice & Lincoln streets and at Halsted street is of old type, operating open arc lamps. About three-fourths of the machines are Western Electric machines, which are now no longer manufactured, the remainder being Brush Multiple circuit machines, but of old type. The arc machines at Wentworth avenue are modern 150-light multiple circuit Brush machines, operating direct current enclosed lamps, which are coupled together in sets of five on the same shaft. The arc circuit switch-boards are contemperaneous with the arc light machines. The underground equipment is of standard manufacture for this character of service. The overhead equipment is standard for this character of service. Of this, 6,706 arc lamps, about 4,180 are old open arc lamps of obsolete type.

Detroit. The boilers are good as tubular boilers. They are double-deck boilers, all the tubes being in the lower shell with an upper shell acting as steam space and carrying the water line. The engines are triple expansion, marine type, built by Samuel F. Hodge, of Detroit, together with three Williams centre valve triple expansion vertical engines. The D. C. arc light dynamos are four-pole Western Electric machines, having a capacity of about 125 arc lights each. The manufacture of these machines has been discontinued. They are giving fairly good service, and the public lighting commission is substituting A. C. enclosed lamps for the present 9.6 open lamps as funds are available. One engine and four of these arc light machines have been dismantled since June, 1905, and the A. C. enclosed lamps substituted. A 2,000 K. W. Westinghouse-Parsons steam turbine has been erected to handle the A. C. lighting since the end of the year covered by our report. The two-phase alternators in service June 30, 1905, are of the induction type. These machines operate satisfactorily on purely steady loads such as street lighting. They would not be considered as modern and efficient machines in general central station service. They would be inefficient in regulation and difficult to operate with any other type alternator. Switch-board equipment is standard and of recent installation. The arrangement is good for handling the service of the plant. The auxiliary plant is of modern and efficient type for engine operation. The underground equipment of conduit and cables, is of standard manufacture. The overhead equipment is standard for this class of work. There are in operation 1,177 9.6 ampere double carbon brush lamps which are of practically obsolete type. There are also 1,828 6.8 ampere A. C. enclosed lamps of General Electric and Western Electric manufacture, together with transformers and regulators of the same type. These latter are of modern and efficient type.

South Norwalk. Boilers are of return tubular type. Steam pressure now in use 95 lbs. There are no records from which we could determine the commercial economy of these boilers. The engine plant consists of a new Dietel (Diesel?) oil engine of high thermal economy, four simple automatic cut-off engines and one simple four-valve engine operating at 95 lbs. steam pressure, and non-condensing. The plant is less efficient than would be the case were the smaller engine units supplanted by one unit of large capacity. The minimum load during the day is such that one small unit is sufficient for this purpose. The electric plant is of 250-volt direct current, with two old type generators and two new type generators on the small engines. There are two modern type generators, one on the oil engine and one on the four-valve engine. The motor generator set for arc lighting is of modern and efficient type, as is also the switch-board, both for street lighting and commercial service.

H 130. Is it in good condition?

Allegheny. It is in generally fair condition except steam piping over boilers.

Chicago. All of the equipment except the arc-machines noted under H 129 is in fairly good condition.

Detroit. The appliances and equipment give evidence of being maintained in good condition. At the time of our examination the steam turbine was being installed, but the condensing apparatus for it had not been completed. The Westinghouse Machine company has the contract for the entire equipment, including piping, condensers and pump. That portion of the plant showed its incomplete condition.

South Norwalk. The plant generally is maintained in good condition for its type.

H 131. Will it be necessary to make extensive repairs and alterations in the near future?

Allegheny. No, not for sake of capacity. Yes, to modernize and get good efficiency.

Chicago. No, the city of Chicago is negotiating with the drainage board for the utilization of water power being developed in the drainage canal, which development will be outside the city limits. The lines will be brought by the drainage board to the city limits, from which point the city will handle it. This development contemplates the immediate installation of 16,000 K. W., with an ultimate capacity for 30,000 K. W. The present plans of the city electrician contemplate additional street lighting by the use of this power, and the maintenance in operation of the present steam generating plants. These four steam plants in the course of rebuilding have been so laid out that they may be driven by induction motors keeping the steam plants in reserve against the contingency of a shut-down.

Detroit. The policy of the public lighting commission, as announced, is to gradually abandon the use of the open-arc light apparatus and substitute A. C. enclosed arc-lighting.

South Norwalk. The growth of business will require an increase of station capacity in the near future according to anticipations of the superintendent. The Diesel engine operates at about one-fourth the fuel cost of the steam engines, so it will probably supplant them sooner or later if it continues to prove satisfactory in other respects.

H 132. Is the plant kept in clean and neat condition?

Allegheny. No, except electric apparatus.

Chicago. With the exception of conditions brought about by construction work in progress at the new plant at Fullerton avenue, all of the plants are kept in a reasonably clean and neat condition.

Detroit. Well kept for this type of plant.

South Norwalk. Yes, for its type.

H 133. Are the works adequately ventilated?

Allegheny. Yes.

Chicago. As much as is necessary in plants of this character.

Detroit. Yes.

South Norwalk. No special means for ventilation are necessary in plants of this character.

H 134. Are pits, shafts and machinery properly guarded?

Allegheny. Machinery of this class not usually guarded.

Chicago. As much as is necessary in plants of this character.

Detroit. As usual.

South Norwalk. Yes, as usual.

GENERAL MATTERS.

H 135. Are offices for payments, complaints, and other business conveniently located?

H 136. Were consumers' complaints promptly and efficiently attended to?

H 137. Describe office system of handling complaints.

H 137*a*. How are leak complaints attended to at night?

These questions do not apply to Allegheny, Chicago and Detroit, which have no commercial business.

South Norwalk.

H 135. Station office about two blocks from business street. Lamps also distributed from a wiring contractors office on a business street.

H 136. Apparently so.

H 137. Trouble-report forms kept in telephone booth, and complaints entered as received. Trouble man on duty at station until 9 P. M. for serious trouble. After 9 P. M. employees called out by steam whistle signal at station. Complaints are made to station in person, by mail and by telephone.

H 137*a*. No underground services.

H 138. Is there a system of badging or uniforming the employees so that they may be known to the public?

Allegheny. Each outside employee wears a badge.

Chicago. Operating and construction men wear badges, principally to identify them to police. Employees do not necessarily come into contact with the general public.

Detroit. Badges for commissioners, secretary, general superintendent, assistant superintendent, chief trimmer and three patrolmen.

South Norwalk. Yes; all employees badged.

H 139. Are the general morale and discipline of the employees good, bad, or indifferent?

Allegheny. We do not consider the length of our visit sufficient to answer this comprehensively. One example was noted which indicated a laxity in discipline, but the shortness of our stay does not enable us to say whether this one example is indicative of the whole organization or whether it was an unusual case.

Chicago. The limited time of our visit was not sufficient for answering this question properly.

Detroit. So far as we did observe in a three days' visit, good feeling obtained among the employees in responsible positions. The condition of the plant would indicate that the general morale and discipline were good.

South Norwalk. We should say the general morale and discipline of the employees as existing at the time of our examination were good. The general superintendent has been in charge for fourteen years; the chief operating engineer for twelve years. The position of assistant operating engineer (position created in 1901) has been held by the same man. Line foreman, for nine years, and both linemen for four years.

H 140. Are the employees who meet the public polite and attentive?

Allegheny. No commercial business.

Chicago. No necessity for coming into contact with the general public.

Detroit. As there is only public lighting handled, employees do not come directly in contact with the general public.

South Norwalk. Only the general superintendent and clerk meet the public.

H 141. Are they neatly dressed?

Allegheny. No, but suitable to laboring occupations.

Chicago. Suitable for the occupation.

Detroit. Employees are dressed suitably for their respective avocations.

South Norwalk. See answer to H 140.

H 142. Do the various departments work in harmony? Is there friction or jealousy, and does one department shirk work, leaving it to be done by another?

Allegheny. Do not consider our visit of sufficient length to answer this question.

Chicago. Our examination did not reveal any lack of harmony.

Detroit. See answer to H 139.

South Norwalk. The operating force consists of general superintendent, one clerk, two engineers, two firemen, one inspector, one lineman, one trimmer, and is not "departmentalized." There is no evidence of friction as between employees.

H 143. Is there an adequate system of telephones?

Allegheny. Use police telephone system.

Chicago. Each central station and repair shop is connected with a private branch exchange in the city electrician's headquarters. Ready communication may be had between these headquarters, but no special telephone arrangements exist other than as above stated.

Detroit. Private telephones are used as accessible, and police telephones may be used.

South Norwalk. This small plant hardly needs a "system of telephones."

H 144. Are the works and offices properly watched at night?

Allegheny. In operation all night.

Chicago. The offices adjoin the room occupied by the fire alarm telegraph department, which is operated day and night. Stations are also operated at night.

Detroit. Stations are operated all night. Offices locked up.

South Norwalk. No watchmen needed. Operates all night.

H 145. Are employees generally permitted to run to fires, or is some one appointed to go?

Allegheny. No special system.

Chicago. The fire alarm telegraph department is under the charge of the city electrician. The headquarters of their outside force is in the yard adjoining the Halstead street station, where direct communication is had with the station operating forces by means of telephone described in H 143. In general, as described by the city electrician, employees do not run to fires unless notified as above.

Detroit. Don't go to fires unless important or on trunk lines.

South Norwalk. General superintendent is fire chief also. Other employees go if electric duties permit.

H 146. Is there any system of inspection to prevent workmen of other companies or city departments from injuring the underground structures?

Allegheny. No underground structures.

Chicago. This system is a part of the operations of the commissioner of public works, who is generally relied upon to protect the underground conduits belonging to the department of electricity.

Detroit. Public works department has inspector on each job, who calls electric light department if necessary.

South Norwalk. No underground structures.

H 147. Has the manager maintained an adequate system of reports made to him of the details of the operation of the plant day by day, so as to show manufacturing results, cost per unit, length of underground or overhead structures installed, etc.?

Allegheny. Forms are provided for daily reports:

(*a*) Of station report,
(*b*) Of construction materials used,
(*c*) Of electrical output.

The A. C. generator output is metered. This output is charged to incandescent service after deducting for the arc-service an amount determined by multiplying the arc lamp hours by 500 watts and dividing by the per cent. efficiency of motor generator sets. The output of engine-driven arc generators is estimated by multiplying the lamp hours by 500 watts.

Chicago. Daily reports are made to the city electrician. All service being series arc, only the A. C. output is metered. The only unit cost is figured per average number of lamps per year.

Detroit. Yes, the management has figures readily available for figuring costs.

South Norwalk. Yes. A daily station report gives electrical output, fuel, oil, etc., used, which, with the daily payroll kept, enables the general superintendent to calculate his unit operating cost. The general superintendent maintains a small map in his office upon which is plotted the outside construction. No printed forms are in use for giving unit cost of construction.

H 148. Attach the form on which the manufacturing records are kept.

Allegheny. Form not reproduced.

Chicago. We furnish them under separate cover. The blanks attached in H 148, if properly maintained, would show actual unit cost of construction.

Detroit. Form not reproduced.

South Norwalk. Form not reproduced.

H 149. Was there a drafting room maintained?

Allegheny and *Chicago*. No.

Detroit. Yes; one draftsman also keeps all maps of lines, foreign pole contacts, etc.

South Norwalk. General superintendent does drafting himself.

H 150. What system was in vogue to take care of the tools distributed to employees?

Allegheny. Practically all the tools used were in the station. There is little or no construction work in progress.

Chicago. No particular system in vogue, but an effort is made to keep track of all tools issued. It is impossible to say whether this is done.

Detroit. Worn-out tools must be returned before new tools are bought.

South Norwalk. Tools as purchased are charged to operating account, and men may purchase tools and supplies as needed.

H 151. Were the different classes of workmen equipped with proper tools? Were the tools kept in order?

Allegheny. Practically no construction work in progress.

Chicago. Apparently-so.

Detroit. Yes, except the carpenter, who furnishes his own tools.

South Norwalk. Yes, apparently.

H 152. With what promptness were orders to turn on current attended to?

Allegheny, Chicago. Detroit. No commercial service.

South Norwalk. No record to show. The general superintendent says, "as soon as service wires can be installed."

H 153. Are service pipes run to every lot, whether built upon or not, prior to street paving or repaving? If so, how many of these dead services are now in existence?

Allegheny. No underground services.

Chicago. No commercial service.

Detroit. No private consumers. Streets already paved within nominal half-mile limit for underground service.

South Norwalk. None made by city, but about six residences have installed their own services underground.

H 154. Are records kept of services by date installed, so that as the service grows old inspection may be made at intervals of years to determine when renewals should take place and insure such renewal before most of the services have begun to give trouble?

Allegheny. No underground services.

Chicago, Detroit. No commercial service.

South Norwalk. No underground services belonging to city.

H 155. Are there any regulations in force regarding the entrance of employees in houses? If so, attach a copy.

Allegheny. No inside work.

Chicago, Detroit. No commercial service.

South Norwalk. No.

H 156. Does any one inspect the work done by employees in consumers' houses?

Allegheny. No inside work.

Chicago, Detroit. No commercial service.

South Norwalk. Work done by wiring contractors.

H 157. If so, is this inspection general, or does it include every job?

Allegheny. No inside work.

Chicago, Detroit. No commercial service.

South Norwalk. The underwriter's inspector makes fire insurance inspection. The city electric inspector makes casual inspections.

SUPPLEMENTARY REPORT, SIGNED BY THEODORE STEBBINS, ON DEPRECIATION FOR CHICAGO, DETROIT, ALLEGHENY, SOUTH NORWALK.

New York, Sept. 5, 1906.

Messrs. Marwick, Mitchell & Co., C. A.,
79 Wall St., New York.

Dear Sirs:

You have requested Mr. C. E. Phelps, Jr., and myself to give you a figure for the depreciation of certain electric light plants whose accounts you audited for the National Civic Federation. Mr. Phelps and I have had several conversations on the matter, and have undertaken herein to present the consensus of our views. I will send a carbon copy of this letter to Mr. Phelps, and ask him to write to you directly in confirmation of my letter or qualify the views as he sees fit.

As we all know, the subject of depreciation is one on which there can be a great variety of opinion, and a great variety of financial methods in handling it. The problem would be simplified if, as the machinery was discarded, it was replaced by exact duplicate machinery. Under this condition depreciation would be simply the physical wearing out of the machinery, and depreciation could be calculated with considerable precision. In many businesses, and particularly in the electrical business, the discarding of machinery is not determined by its actual wearing out, but rather by the progress of the art rendering available something new that would give better service or be less expensive to operate, either or both. Under this condition the calculation of depreciation gives a problem of judging the rapidity of progress in the art.

Electric lighting has been a commercial business for twenty years, and our past experience is that scarcely any piece of apparatus has not been so improved within ten years of its manufacture that it could not be discarded to advantage in favor of a more efficient substitute. Certain exceptions are made, however, to this judgment as indicated hereinafter.

The several plants under consideration, all except South Norwalk, light the public streets and buildings only, with no commercial business, and were established with open-arc lamps, and are now in process to changing these to enclosed-arc lamps, the change being about half made, more or less, for each individual plant.

The depreciation figures which we give, since they are not based on the natural physical wearing out for the particular year, can be considered as what we believe are proper for a series of years for plants of this particular description. In arriving at the figures we have first made a specific calculation by dividing the investment into various parts, as follows:

(1) Land. Ordinarily this would appreciate some, but its cost is a small part of the whole cost, and its appreciation would have a small effect on the total net depreciation, so we eliminate this from depreciation.

(2) Poles. Enough new poles should be set each year so that the pole lines are properly maintained, and this should be charged to operating expenses, so we eliminate this item from the depreciation fund.

(3) Conduits. These show slight depreciation, but it does not seem safe to assume that the progress of the art may not render them unnecessary a generation hence, so we assume these will have a use of 33 1/3 years, and add 3 per cent. of the cost to the depreciation fund.

(4) Cables. These may depreciate scarcely at all if carefully protected, or rapidly, if exposed. We assume twenty years' use and 20 per cent. scrap value at the end of twenty years, and add 4 per cent. of their value into the depreciation fund.

(5) Overhead Wires. We assume these are used ten years, and then have a scrap value of 60 per cent., and add 4 per cent. of their cost into the depreciation fund.

(6) Balance of Plant. In the case of the particular plants under consideration we believe no other parts need be given for special depreciation, but that the balance can safely be assumed on the average for a ten year use, and then a 10 per cent. scrap value, and add 9 per cent. of its cost to the depreciation fund. No arc apparatus heretofore manufactured has remained standard more than ten years. True, some of it may have been used more than ten years, but it would have paid to discard it before that time for the sake of good service and economy in operation. Of the other parts of the equipment not specifically included under other headings, some can be used to advantage more than ten years, and other parts less, and we believe ten years is a fair average.

We have taken the present cost to rebuild each of the plants, and calculated the depreciation on the basis just specified, and we have then adjusted these figures somewhat, depending on how much has recently been spent for improvement of the plants, and somewhat according to how much, if any, obsolete apparatus still remains in use. The figures specified are not to be treated as a sinking fund, but as an amount to be spent from year to year in maintaining in condition for best service plants that have already been in operation a number of years.

In making an investment in new machinery of these depreciation funds, the money might buy the same capacity of machinery in replacement at a lower cost, in which case the balance of the fund could be used to increase the capacity, or to liquidate the original investment, or new machinery of equal capacity might cost more on account of greater efficiency, in which case additional funds would be added to the depreciation fund for an increased investment of the same capacity. What we are assuming is a plant that has already been in operation a number of years, and that sets aside annually such a fund that the plant can be kept up to date to perform the best service, and whose property book-value shall be in proper relation to the present physical value of the plant.

Having these purposes in end, we recommend the following respective amounts for an annual depreciation fund:

Chicago	$100,000
Detroit	60,000
Allegheny	30,000
South Norwalk..............	7,000

Yours truly,

(Signed) THEODORE STEBBINS.

FINANCIAL MATTERS

United States Electricity Works

(Schedule IV)

By MARWICK, MITCHELL & CO., Chartered Accountants

I—FINANCIAL MATTERS.

I 1. Secure and transmit a printed or written copy of all rate schedules, forms of contracts, schedules and conditions of discounts, rebates, deposits, penalties, etc., so as to show in detail all charges, such as for tapping mains and turning on current, which any consumer might be called upon to pay, as in force at the end of the last fiscal year.

Allegheny. For the fiscal year ending February 28, 1905. The bureau is conducted for public lighting only.

Chicago. For the fiscal year ending December 31, 1905.

The department is conducted for public lighting. The only private consumers are: Lincoln Park commissioners, Pittsburg, Cincinnati, Chicago & St. Louis Railway Company, Chicago & Northwestern Railroad Company, Northwestern Elevated Railroad Company (See Sec. M 2).

Detroit. For the fiscal year ending June 30, 1905.

South Norwalk. For the fiscal year ending January 1, 1906.

I 2. If any of the above schedules, forms, contracts, etc., differed materially from those in force during the last fiscal year, state differences.

Allegheny. ——

Chicago. There were no contracts with these consumers.

Detroit, South Norwalk. No differences.

I 3. Have rates fluctuated?

Allegheny, Chicago. ——

Detroit, South Norwalk. No.

I 4. Were these schedules, contracts and rules strictly enforced?

Allegheny, Chicago. ——

Detroit. Yes.

South Norwalk. Yes, practically so.

I 5. Were extensions to new territory made free or were they charged for under these rates?

Allegheny, Chicago. ——

Detroit. The cost of extensions is borne by the public lighting commission.

South Norwalk. All extensions to new territory were made free.

I 6. Did consumer pay for damages and repairs to meters and any other appliances furnished by company or municipality?

Allegheny, Chicago. ——

Detroit. The cost of ordinary repairs to meters is met by the public lighting commission. The original supply of incandescent lamps is given to the consumer free of charge. There were no damages to meters.

South Norwalk. All repairs and damages to meters and any other appliances form a charge against the electric works.

I 7. Did consumer pay for connections with mains?

Allegheny, Chicago. ——

Detroit. No; so far as this municipality is concerned, the supply to consumers is given in order to accommodate them. These consumers are as follows:

(1) Two stores in the public building known as the Grand Army Republic building.

(2) Detroit Boat club; because of its situation at Belle Isle, the club is unable to get current elsewhere.

(3) Wayne County building and county jail.

(4) Detroit Yacht Club.

(5) Miscellaneous.

South Norwalk. No, except where overhead service connections extend beyond fifty feet from the street curb. Connections from private underground service must be provided by the consumer, and must be run to and up the nearest and most convenient pole of the electric works, to within two feet of the street main on same.

I 8. Was any part of the cost of laying pipes and main paid by consumers or property owners? If so, what?

Allegheny, Chicago. ——

Detroit and South Norwalk. No.

I 9. If meters or any appliances or renewals were supplied free to consumers, state what and upon what conditions.

Allegheny, Chicago. ——

Detroit. Renewals of incandescent lamps are made free, providing the stub of lamp, which is useless to consumer for illuminating purposes, is returned. No charge is made for rental of meters. Meters are renewed free of charge if worn out by ordinary wear and tear.

South Norwalk. Meters and service boxes are supplied free of charge, together with all renewals of same. The first installment of standard incandescent and arc lamps is supplied without cost to the consumer unless otherwise agreed upon. Renewals of the standard sizes of incandescent lamps that have burned out or that have become dim, if returned with the globe or base, are supplied without cost to consumers. Arc lamps for factories require to be paid for by the consumer or property owner, but are maintained free. As an accommodation inspections are made to locate defects or troubles in consumers wiring and fixtures, and temporary safety fuses for lighting are replaced without cost, except fuses of the enclosed type. Consumers must furnish the necessary connections to meters.

I 10. Were rates reduced or increased between January 1, 1900, and December 31, 1905?

Allegheny, Chicago. ——

Detroit. No.

South Norwalk. Yes.

I 11. If so, to what extent?

Allegheny, Chicago, Detroit. ——

South Norwalk. Changed from flat rates to meter rates in May, 1903. The flat rates varied according to the number of lamps and hours to be used, location and business.

The meter rates from May, 1903, and at January 1, 1906, were as follows:

Per K. W. hour per monthly bill; lighting, and power up to 1/5 H. P.:

First 100 K. W. hours, 10 cents per K. W. hour;
Next 200 K. W. hours, 8 cents per K. W. hour;
Over 300 K. W. hours, 6 cents per K. W. hour.

The rate for 1,000 K. W. hours or more per monthly bill was reduced August 1, 1904, to 6 cents per K. W. hour.

Power over 1/5 H. P.:

First 200 K. W. hours, 5 cents per K. W. hour.
Next 400 K. W. hours, 4 cents per K. W. hours.
Over 600 K. W. hours, 3 cents per K. W. hour.

Ten per cent. discount is allowed from all bills paid within ten days from date of bill.

A few small accounts were still on flat rates January 1, 1906, and these are also subject to the ten per cent. discount as above, except in one instance. The city accounts are on flat rates and are not subject to discount.

Of the city accounts the rates relating to street lighting have been as follows:

1900, $66.00 per lamp per year.
1901, $66.00 per lamp per year.
1902 to 1906, $60.00 per lamp per year.

Minimum bills for mercantile buildings for power or light, $1.11; private houses, $0.55; subject to discount as above.

I 12. Was the reduction voluntary, the result of law or ordinance or competition?

Allegheny, Chicago, Detroit. ——

South Norwalk. The change was voluntary.

I 13. If plant has undergone a change from private to public management, or vice versa, give rates just before and just after change, with dates.

All four of the plants have always been under public management.

I 14. Were bills considered as liens against property, or simply as bills against the consumer?

Allegheny, Chicago. ——

Detroit, South Norwalk. As bills against the consumer.

I 15. How were bills collected?

Allegheny, Chicago. ——

Detroit. Bills are sent out monthly; consumers forward checks in settlement therefor.

South Norwalk. The bills are partly mailed and partly delivered. Payments are made at the works office and at the city agency, or they may be mailed. The discount period is from the first to the tenth of the month, inclusive. After the fifteenth the bills are collected at consumers' residences and places of business. The city agency is an electrical supply store, owned by Messrs. Reed and Volk, who collect any accounts from consumers during the discount period only. No security is in force to cover their transactions, and they do not receive any remuneration. The clerk of the electric works collects from them daily.

I 16. How often were collections made?

Allegheny, Chicago. ——

Detroit, South Norwalk. Monthly.

I 17. What system of accounts was used during the last fiscal year?

Allegheny. No proper system of accounts was in force, nor were the books kept on the double entry system. All cash transactions were handled by the comptroller at the city hall, the books kept at the plant purporting to contain the distribution of operating accounts. The system in use was not detailed enough for the purpose of the schedule. Owing to this and the fact that it is now impossible to arrive at the correct distribution of certain items, we had in such cases to estimate the distribution.

Chicago. No particular system of accounts is in use. While the present system may contain sufficient information for the bureau, yet it was not detailed and elaborate enough to furnish the information required by this schedule, without involving an analysis of various accounts. That analysis was further rendered necessary owing to the practice towards the end of the year of charging out bills erroneously, where the appropriation for a particular class of expense had become exhausted. In construction work no detailed records are carried on the books. No separate balance sheet of the bureau or of the department is prepared at the close of the fiscal year.

Detroit. Stated generally, the system is comprehensive and in satisfactory detail, a store-room account being kept, and the distribution of expenses made under suitable headings.

South Norwalk. The accounts have not been kept in conformity with any particular system. While they are, however, kept in such a manner that information relating to the operations of the plant is readily obtained from one source or another, yet there is ample scope for improvement in the keeping of the records. This improvement could be accomplished by congregating into the ledger the summarized results or monthly totals of the subsidiary books of accounts, a more elaborate analysis of revenue and expenses, and in other ways.

I 18. By whom were the accounts audited?

Allegheny. ——

Chicago. Auditor's department of the city.

Detroit. W. D. Gridley, city accountant. It is part of the duty of the city accountant to audit the electric light plant books.

South Norwalk. Victor W. Ferris, city auditor. From the information obtained, it is evident that the so-called audit was of a very superficial nature involving chiefly a comparison of the cash payments with the vouchers.

I 19. Who paid for this auditing?

Allegheny. ——

Chicago. The city.

Detroit. The city by general taxation.

South Norwalk. The city.

I 20. Who selected the auditor?

Allegheny. ——

Chicago. Auditor Louis E. Gosselin was selected by the city comptroller from the civil service list.

Detroit. The mayor, approved by common council.

South Norwalk. The vote of the public.

I 21. Was each item charged to the proper account?

Allegheny. No.

Chicago. No. See answer to I 17.

Detroit. Yes.

South Norwalk. Yes, in accordance with the headings of accounts carried in the books.

I 22. What provision was there for assuring that each item was properly charged?

Allegheny. An "order" is made out by the engineer or foreman for all material stating for what purpose required. This is sent to the office, and a requisition signed by the superintendent is made out and sent to the department of public works, who authorize the purchase. On bills being rendered, they are checked with the original orders and charged out in accordance therewith. The expenses were charged to accounts designating the nature of the goods in cases where a supply of these goods was kept on hand, and not, thereafter, charged to accounts designating the purpose of consumption. No store-room account was kept.

Chicago. When material is required, a requisition is made out and marked with the number of the account to which the amount has to be charged. This requisition is approved and signed by the city electrician, and sent to the business agent's department in the department of supplies, who orders the goods or supplies them out of stock. When the bill is rendered it is checked with the requisition and marked with the number of the account to which it has to be charged, as shown by the requisition.

Detroit. Invoices for purchases and expenses are in duplicate. The originals are examined by the auditing committee of the public lighting commission and are then sent to the city comptroller, who approves same. They are then placed before the mayor and council weekly. Having been passed by them, the payments are made in the following week. The city accountant's audit is a check on the accuracy of the charges to the accounts.

South Norwalk. The superintendent passes and approves the invoices and marks thereon the names of the accounts to be charged. The board of commissioners approve the charges for payment, and the invoices are then entered in the books by the clerk.

I 23. Were the accounts of the particular plant kept separate from all others and from the general accounts of the city?

Allegheny. Yes.

Chicago. The bureau of municipal (electric) lighting comes under the "department of electricity," which also embraces the following bureaus:

(1) The police and fire alarm telegraph.
(2) Electrical inspection.
(3) Automobile licenses.
(4) Gas lighting and repairs.

The accounts of these bureaus are to a certain extent kept separate, but in some cases, e. g., administration salaries and administration expenses, one account is carried for the whole department. Consequently in such cases we have had to take a percentage as applicable to the electric light accounts.

Detroit. Yes. The inspection department comes under the direction of the public lighting commission. The accounts of that department are entered in the books of the commission, but are separate from the accounts relating to the electric light plant operations.

South Norwalk. Yes. The accounts of the fire alarm system are entered in the same books, but are kept separate from the accounts of the electric works.

I 24. Were expenses for the following items charged upon the books of the plant and included in the financial returns given below? (Answer each separately.)

Allegheny.

(1) Taxes. No.

(2) Accident insurance. No; none carried.

(3) Fire insurance. Yes.

(4) Boiler insurance. Yes.

(5) Water used by plant. No.

(6) Claims and damages. No. Wages paid during incapacity owing to injury were charged on the books. There were no other claims or damages.

(7) Gas used in plant and offices. No.

(8) Rental of lands and buildings not owned, but used. Yes.

(9) Interest on bonds. No.

(10) Interest on liabilities. No.

(11) Depreciation. No.

(12) Sinking funds. No.

Chicago.

(1) Taxes. No.

(2) Accident insurance. No; none carried.

(3) Fire insurance. No; none carried.

(4) Boiler insurance. No; none carried.

(5) Water used by plant. No.

(6) Claims and damages. No. Wages paid during incapacity owing to injury were charged on the books. There were no other claims or damages.

(7) Gas used in plant and offices. No gas used.

(8) Rental of lands and buildings not owned, but used. No; with the exception of a ground rent of $2,500, which is paid by the department for ground at South Halstead street, 50 per cent. of which we have charged against the electric light bureau operations. The management, however, only charge 25 per cent. against operations, 25 per cent. to construction, and 50 per cent. against police and fire alarm telegraph bureau. There are no buildings not owned but used.

(9) Interest on bonds. No.

(10) Interest on liabilities. No.

(11) Depreciation. No.

(12) Sinking funds. No.

Detroit.

(1) Taxes. No.

(2) Accident insurance. No; none carried.

(3) Fire insurance. No; none carried.

(4) Boiler insurance. Yes.

(5) Water used by plant. No. Water obtained from the river is not charged for by taxation or otherwise by the city of

Detroit. The cost of pumping is included in the expenses of operating the plant. The water works rate is $1.75 per 30,000 gals. quarterly, and 2½ cents per 1,000 gals. for all in excess of 30,000 gals.

(6) Claims and damages. Yes. Claims for compensation for injuries caused by accidents. There were no other claims or damages.

(7) Gas used in plant and offices. No. The amount for the year is $15.60. Gas is used in the blacksmith shop principally. Electric light is used in the plant and offices.

(8) Rental of lands and buildings not owned, but used. No.

(9) Interest on bonds. No.

(10) Interest on liabilities. No interest payable.

(11) Depreciation. Yes; by a credit to construction account, and a debit to investment account.

(12) Sinking funds. No.

South Norwalk.

(1) Taxes. No.

(2) Accident insurance. No.

(3) Fire insurance. Yes.

(4) Boiler insurance. Yes.

(5) Water used by plant. No.

(6) Claims and damages. Yes.

(7) Gas used in plant and offices. No gas used.

(8) Rental of lands and buildings not owned, but used. All land and buildings used are owned.

(9) Interest on bonds. Yes.

(10) Interest on liabilities. Yes.

(11) Depreciation. No.

(12) Sinking funds. No.

I 25. When any city officer performed a service for the plant (*e. g.*, city treasurer or corporation counsel), was any part of his salary charged against the plant?

Allegheny. Chicago. Detroit. No.

South Norwalk. The city auditor was the only city officer who performed a service for the plant, and no part of his remuneration of $20 for the whole of the city work was charged against the plant.

I 26. Were there any other charges which should properly be included in expenses, but which are actually paid from other sources and were not charged to the plant?

Allegheny. City comptroller and staff, proportion of salaries and expenses;

Department of public works; proportion of salaries and expenses;

City paving department, for paving work done in connection with lamp post foundations; (Very little work done.)

Stable rent and feed of three horses belonging to the bureau of municipal lighting but stalled in the city stables;

Telephone rent.

Chicago.

Comptroller and auditor and staffs, proportion of salaries and expenses;

City treasurer and staff, proportion of salaries and expenses;

Law department, proportion of salaries and expenses;

Department of supply, proportion of salaries and expenses;

Rent of premises in city hall;

Ground rent of land belonging to the city but not to electric light bureau. The ground referred to is occupied by the plants at Indiana avenue, Chicago avenue, and Fullerton avenue and is owned by the water department of the city, and no rent paid therefor, but this is partially offset by the water department having the use of building (plant No. 1, Indiana avenue), which is not now used by the electric light bureau.

Detroit, South Norwalk. No.

I 27. Was the income account credited with services to city departments, such as current for lighting or heating of public buildings, parks, streets, open spaces, etc.?

Allegheny. The plant was in use solely for these purposes, but no income account was kept nor credit given for these services.

Chicago. No credit was given for these services.

Detroit. Not for current supplied, but for work done for the departments by men employed by the public lighting commission, at cost.

South Norwalk. Yes.

I 28. Name any other items that should be credited to the income account that were not on the books.

Allegheny. Amount received for scrap sold, $852.78.

Chicago. Estimated value of steam heat supplied to police and fire alarm offices at 6345 Wentworth avenue—estimated by management at $2,424.24.

Estimated rent of building at No. 1 plant, Indiana avenue, used by water department—4 per cent. on $16,544, as valued by city real estate expert, $660.00.

The bureau is entitled under Sec. 1997, Art. 5 of the municipal code of 1905 (see extract given below), to charge the street and elevated railroad companies for current supplied in lighting 307 lamps at places where their tracks cross or intersect at any of the streets. In the case of the above lamps, no charge, however, has been made by the bureau.

We understand the bureau has the privilege of stringing its wires on the poles of the following companies, for which no charge is made:

Chicago Telephone company
Postal Telegraph company
Western Union Telegraph company
Commonwealth Electric company
Chicago City railway
Chicago Union Traction company.

This, however, is offset by the corresponding privilege these companies have of stringing their wires on city poles. We have been unable to obtain any figures as to the relative values of these privileges.

Municipal Code, 1905, Art. 5, Sec. 1997.

"Every person or corporation owning or operating any steam, elevated or street railway, whose track or tracks cross or intersect at, above, or below grade of any of the streets within the city, shall, and they are hereby required to provide at their own expense proper and sufficient lights, and care for the same, at all such crossings or intersections. Such lights shall be of such kind as may be approved by the commissioner of public works."

Detroit. Rental for the privilege the fire and police departments have of stringing wires on the poles of the public lighting commission. Estimated by the management at $485.40, being at the rate of 10 cents a contact.

South Norwalk. Rent of fire alarm quarters at $12 per month, $144.00 E.

Free service to church fairs, etc., valued at a nominal amount only.

An agreement between the electric works, the Connecticut Railway & Lighting company, and the Southern New England Telephone company permits these two companies, under certain conditions to string their wires on the poles of the electric works, the electric works having a like privilege on the poles of these companies. The management estimate the net value of the privilege obtained by these companies at not less than $1,000 for the year.

About $120 per annum is charged to the city fire alarm system and paid for, for proportion of wages of electric works employees engaged on work for the fire alarm system. The management consider that, were the city required to engage men especially for the work referred to, the cost would not be less than $365.

I 29. Was current supplied free to any one?

Allegheny, Chicago, South Norwalk. Yes.

Detroit. The city; for street lighting, public buildings and institutions—except Wayne county building and jail—and lighting of plant and offices.

I 30. If so, to whom and upon what conditions?

Allegheny. The city; for street and public lighting.

Chicago. The city; for street lighting, water department (70 arc lamps in pumping stations), fire department (21 arc lamps in engine houses).

Detroit. The object of the existence of the Detroit public lighting commission is to supply electric light and power in the streets and public buildings of the city at actual cost, which amount is raised by general taxation. Sec. 2 of public building ordinance says: "It shall be the duty of the public lighting commission to furnish the electrical current required for the proper lighting of all public buildings. Any electric current supplied by the said commission may be used in said building for the driving of ventilating fans or other similar appliances;" and Sec. 3 says: "* * * The public lighting commission shall include in their estimates hereafter the expense of such lighting of all public buildings, or such of them as the board or commission in charge thereof shall require to be lighted."

South Norwalk. Church fairs, etc.

I 31. What was the approximate value of these free services?

Allegheny, Chicago, Detroit. ——

South Norwalk. A nominal amount only.

I 32. To what account was it debited and credited?

Allegheny, Chicago, Detroit. No charge was made to the city for current supplied.

South Norwalk. It was not dealt with on the books.

I 33. Has the amount been credited on the books and no further attention paid to it, or have bills been rendered with the understanding that they were not to be paid?

Entries were not made on the books at any of the plants. No bills were rendered.

I 34. Was there a store-room account to which materials were charged when purchased?

Allegheny, Chicago, South Norwalk. No store-room account was kept.

Detroit. Yes.

I 35. What was the system of charging them out to operating accounts when used?

Allegheny, Chicago, South Norwalk. ——

Detroit. Requisitions are made, approved by the foreman, for all supplies (except coal) which are obtained from stock on hand. The necessary entries are made crediting the store-room accounts, and debiting the various accounts chargeable. Coal is weighed upon entering the plant, and the records of the weights and consumption kept by the chief engineer in a "log book."

I 36. If there was no store-room account, how were materials charged?

Allegheny. Materials were charged direct to operating and construction accounts, when bills were passed and approved for payment and entered on the books.

Chicago. The requisitions for materials state for what purpose they are required and are marked with the number of the account to which they have to be charged. The bills are checked with the requisitions and charged accordingly.

See also latter portion of answer to Q. N 14 (*a* and *b*).

Detroit. ——

South Norwalk. Materials and supplies were charged to their respective accounts when the bills were entered in the books, which was usually at the time of payment.

I 37. If the plant was run at a loss, how was the deficit met?

Allegheny. The expenses of the plant were met from annual appropriations and from the proceeds of bond issues.

Chicago. Operating expenses were met from annual appropriations. Construction expenses were met by an appropriation of part of the permanent improvement bond fund of the city and from "special deposits." See J 19.

Detroit. The expenses of the plant are met from annual appropriations. Chapter 13, Section 6 of the public lighting act, as amended, says: "The said commissioners shall have a general supervision and management of all public lighting and all employees engaged in or about the construction or operation thereof, and shall make the necessary purchases of fuel, tools, supplies, materials, apparatus and appliances required in the operation, and management of said plant, without further approval or confirmation of their contracts by the common council; provided, that the expenditures for the operation and management of said plant shall not exceed in any one year the tax levied for that purpose * * *"; and Sec. 8 says: "No contract shall be let or any purchase be made of any lands or property requiring the payment of any money, nor shall any moneys be paid for public lighting in excess of the tax levied for that purpose or of moneys raised by issuing bonds as herein provided."

South Norwalk. No such condition to be met.

I 38. How did the rate of interest paid by the city compare with the rate paid by private public service companies?

Allegheny.

Name of Company.	*Rate of Interest. Per Cent.*	*Amount.*
Pittsburg & Allegheny Valley Railroad company	5	$400,000 00
Allegheny County Light company	6	500,000 00
Pittsburg & Allegheny Telephone company	5	1,400,000 00
The Manufacturers' Light & Heat company (Pittsburg)	6	8,785,000 00
City of Allegheny bonds, other than electric light:		
Municipal	4	$163,000 00
Renewal	4	117,000 00
Water Main	4	427,000 00
Renewal Water	4	350,000 00
Sewer	4	350,000 00
Renewal wharf	4	28,000 00
City Park	4	40,000 00
Judgment fund	4	400,000 00

Name of Company.	*Rate of Interest. Per Cent.*	*Amount.*
Street improvement	4	$1,426,000 00
Water	4	1,376,000 00
Sewer improvement	4	167,000 00
Highway improvement	4	250,000 00
Grand avenue	4	25,987 00
McIntyre avenue	4	11,658 00
Drum street	4	4,576 00
California avenue	4	32,000 00
Ley street	4	1,000 00
Clifton avenue	4	1,000 00
Old Franklin road	4	17,968 00
Melrose avenue	4	6,580 00
Termon avenue	4	12,047 00
Superior avenue	4	43,487 00
Wabash avenue	4	18,638 00
Brighton road	4	147,202 00
Norwood avenue	4	6,242 00
Ashton street	4	5,432 00
Fleming avenue	4	28,040 00
Woodland avenue	4	9,527 00
Brighton avenue	4	5,302 00
Shady avenue	4	21,143 00
Chester avenue	4	20,607 00
Temporary loan	4	34,809 52
City Home	3½	91,000 00
Sewer improvement	3½	47,000 00
Water	3½	388,000 00
Street improvement	3½	302,000 00
Public Safety	3½	77,000 00

Chicago.

Name.	*Rate.*	*Amount Outstanding.*
Chicago Edison company	5	$5,500,000 00
Commonwealth Electric Co	5	6,000,000 00
Chicago Suburban Water & Light Co.	5	700,000 00
Chicago Electric Traction Co	5	650,000 00
Peoples' Gas Light & Coke Co	6	4,900,000 00
Peoples' Gas Light & Coke Co	5	7,900,000 00
Peoples' Gas Light & Coke Co.		
Bonds assumed:		
Equitable Gas Light & Fuel Co	6	2,000,000 00
Chicago Gas Light & Coke Co	5	10,000,000 00
Consumers' Gas Co	5	4,246,000 00
Illinois Light, Heat & Power Co.	7	500,000 00
Lake Gas Co	6	300,000 00
Mutual Fuel Gas Co	5	5,000,000 00
Calumet Gas Co	6	250,000 00

Name.	*Rate.*	*Amount Outstanding.*
Chicago Union Traction Co.		
Bonds assumed:		
Chicago West Division Railway Co.	4.5	$4,016,000 00
Chicago Passenger Railway Co.	5	1,600,000 00
West Chicago Street railroad	5	3,864,000 00
West Chicago Street railroad	5	6,136,000 00
West Chicago Street railroad Tunnel company	5	1,500,000 00
North Chicago City railroad	4	500,000 00
North Chicago Street railroad	5	3,171,000 00
North Chicago City railway	4.5	2,500,000 00
North Chicago Street railroad	4.5	1,614,000 00

NOTE.—The above information was obtained from Moody's Manual, 1906.

City of Chicago Bonds.

Water loan	3.5	$328,500 00
Water loan	4	3,241,500 00
Sewerage loan	4	1,666,500 00
River improvement	4	2,605,500 00
Village Rogers Park	5	7,000 00
Municipal	4	60,000 00
Municipal	3.5	775,000 00
School	4	760,000 00
School	3.5	135,000 00
Tunnel	4	100,000 00
Tunnel	3.5	396,000 00
World's Fair	4	4,293,000 00
Judgment funding	4	5,250,000 00
Permanent improvement	4	3,000,000 00
General corporate purposes	4	2,000,000 00

Detroit. Bonds.	*Rate.*
Detroit Edison Electric Co.	5
Michigan Telephone Co.	5
Detroit Gas Co.	5
United Street Railways Co.	4.5

Information obtained from Carson, Gray & Co., stock brokers, Detroit, Mich.

City bonds, other than electric light and special assessment bonds:

Class.	*Interest rate.*	*Amount.*
Public sewer	3.5	$331,000 00
Public sewer	4	1,700,000 00
Public improvement	3.5	300,000 00
Public improvement	3.65	100,000 00
Public improvement	4	150,000 00
Public school	3.5	828,000 00

Class.	*Interest rate.*	*Amount.*
Public school	4	$600,000 00
Public building	3.5	120,000 00
Public building	4	38,000 00
Boulevard improvement	4	500,000 00
Park improvement	3.5	250,000 00
Park improvement	4	400,000 00
Park and boulevard	3.5	181,000 00
Park and boulevard	4	230,000 00
Museum of Arts	3.5	50,000 00
Water	6	192,000 00
Water	4	100,000 00
Water	3.5	550,000 00
Refunding water	3.5	200,000 00
Refunding water	4	100,000 00

South Norwalk. Bonds.

Name of company.	*Rate.*
The Connecticut Railway and Lighting Co.	4.5
Southern New England Telephone Co.	5

City bonds, other than electric light bonds, are as follows:

Purpose.	*Amount.*	*Due.*	*Rate of interest, per cent.*
Library	$5,000	1928	4
Refunding	67,500	1925-35	4
Funding	70,000	1925-35	4
Water	211,000	1909-35	4

I 39. In the case of municipal plants, was an appropriation made for the plant?

I 40. Was it lump sum or in detail?

Allegheny, Chicago. Definite sums were appropriated for specific items of expenditure.

Detroit. Appropriated a lump sum of $178,756.13, for which taxes were levied. The city comptroller reports weekly to the secretary of the public lighting commission the amount collected. The secretary makes monthly entries in the books of these amounts. Should the amount received from taxes during the last month of the fiscal year prove, together with the amounts previously reported, less than the amount appropriated, the comptroller makes up the deficiency from a contingent fund which is adjusted in the succeeding year.

South Norwalk. The city made an appropriation in lump sum of $22,000, of which only $10,000 was received during the year, for extension of the plant, the electric works giving notes for all sums received from the appropriation.

I 41. What is the amount of the bonds or other liabilities of the plant cancelled since it began operation?

Allegheny. Bonds, $9,000 (actually paid and cancelled). Temporary loan bonds, $7,809.52. See J. 18.

Chicago. No bonds were issued specifically for the electric light bureau.

Detroit. No bonds or other liabilities have been cancelled since the plant began operations. Included among the resources of the sinking fund of the city are $25,000 of 4 per cent. public lighting bonds.

South Norwalk. Notes, $18,639.60.

Issued	$49,639 60
Less amount still outstanding	31,000 00
Equals	$18,639 60

I 42. What provision is being made for paying off the bonds when due?

Allegheny. Accumulation by the city of sinking fund for redemption of bond issues, *a*, *b* and *c* shown in answer to Q. J 16. Other issues are being paid off from assessments.

Chicago. ———

Detroit. No special provision is being made for paying off the public lighting bonds when due. The general sinking fund of the city would be available for this purpose.

South Norwalk. No provision is being made for paying off the bonds when due. The notes are being gradually repaid out of surplus funds.

I 43. If there were any items omitted from any of the following accounts, state what, give amounts, actual or estimated, and state reasons why these should be included and the method of computing all estimates.

Allegheny.

(1) Taxes, on basis of assessed valuation, $474,800 for city taxes only, at 19 mills (Public service corporations are not assessed for county taxes).	$9,021 00
(2) Accident insurance (insurance companies consider this a prohibited risk).	
(3) Depreciation, based on observations and calculations made by engineers	30,000 00
(4) Water consumption, estimated by engineers at 30,000,000 gals., which at 10 cents per 1,000 gals. is	3,000 00
(5) City comptroller and staff, proportion of salaries and expenses, estimated on the basis of the probable cost of these services to the bureau were it conducted as a distinctly separate department of the city	1,000 00
(6) Telephone rent, estimated by management at	200 00

(7) Stable rent and feed of three horses—the cost of board and feed as estimated by the management is	$600 00
Chicago.	
(1) Taxes on $272,412 (being 1/5 of the approximate value of real and personal property during the year under review, based on the appraised value at Dec. 31, 1905) at 67.93 mills per dollar, being the average of the rates levied during the year in the several districts of the city for state, county and city purposes	18,505 00
(2) Accident insurance (insurance companies consider this a prohibited risk).	
(3) Fire insurance on $88,793.98, value of buildings, at 1 per cent	888 00
(4) Fire insurance on $283,428.22, value of machinery, at 1¼ per cent. (Rates based on information obtained from Connecticut Fire Insurance Company)	3,543 00
(5) Boiler insurance, at $30 per boiler for three years, based on information obtained from the Hartford Steam Boiler Inspection and Insurance Company	50 00
(6) Depreciation, based on observation and calculations made by the engineers	100,000 00
(7) Water consumption, estimated by the engineers at not less than 1,400,000,000 gals., which at city water rates equals (See Q. I 50)	59,640 00
(8) Ground rent of land belonging to the city, but not to the electric light bureau, occupied by plants at Indiana avenue, Chicago avenue and Fullerton avenue, estimated by management at 4 per cent. on values as appraised by the city real estate expert, amount	1,918 00
(9) Comptroller and auditor and staffs, proportion of salaries and expenses, estimated at	*1,500 00
(10) City treasurer and staff, proportion of salaries and expenses, estimated at	*2,000 00
(11) Law department, proportion of salaries and expenses, estimated at	*500 00
(12) Rent of premises in city hall, estimated at	*1,500 00
Detroit.	
(1) Taxes on $603,048 (being ¾ of the approximate value of the real and personal property during the year under review, based on the appraised value at June 30, 1905). The tax rate for	

---

* The above estimates are based on the probable cost of these services to the bureau were it conducted as a distinctly separate department of the city.

the year 1905 was $17.41 per $1,000 for the city, school, highway, police, county and state purposes. The rate and method of levying the assessment were obtained from the secretary of the public lighting commission. Amount	$10,498 00
(2) Accident insurance (insurance companies consider this a prohibited risk).	
(3) Fire insurance—9/10 per cent. on $200,890, value of buildings and machinery—rate based on information obtained from the engineers..	1,808 00
(4) Depreciation, based on observations and calculations made by the engineers	60,000 00
(5) Gas used in plant. Owing to a dispute between the gas company and the city, the bill for gas for the year was not entered on the books. Gas is used principally in the blacksmith shop, electric light being used in the plant and offices	15 60
(6) Rental for privilege the department has of stringing its wires on the poles of the police and fire departments, estimated by management at 10 cents a contact	192 40
(7) Legal services of corporation counsel, as estimated by superintendent	150 00
(8) Rent of space at schools, and ground rent of transformer-house site, as estimated by management	250 00
South Norwalk.	
(1) Taxes, 18 5/8 mills per dollar on an estimated assessable value of $52,000	968 50
(2) Accident insurance (insurance companies consider this a prohibited risk).	
(3) Water consumption, estimated by management at 4 gals. per H. P., of 200 H. P. per hour equals 7,008,000 gals., which, at 5 cents per 1,000 gals., equals	350 00
(4) Depreciation, based on observations and calculations made by the engineers	7,000 00
(5) Rentals of telephones, being the regular rental of telephones presently being obtained free or at half rates	130 00

I 44. In construction work, has a detailed record been kept of expenditures so that the amount spent to date is known?

Allegheny. No detailed record has been kept.

Chicago. No detailed construction accounts are carried on the books, construction expenditure of every description being charged to "special deposit" or "extraordinary expense" accounts. A further distribution is kept under the headings of real estate, buildings and equipment. Detailed records are not in use.

Detroit. The ledger accounts show a good analysis of plant, but no full detailed record is kept.

South Norwalk. Yes.

I 45. Have records been kept so that it is known that the total cost will exceed the appropriation before the indebtedness for the excess is incurred?

For all four of the plants. Yes.

For Detroit, see last part of answer to I 37. (Sec. 8 of public lighting act.)

I 46. Coal used during the last fiscal year for fuel.

(a) Anthracite or bituminous.
(b) Brand.
(c) Cost per ton (2,000 pounds) delivered.
(d) Number of tons (2,000 pounds) consumed.

Allegheny. Bituminous, nut and slack, Mansfield coal.

Tons.	*At.*
7,574	$1 88
13,189	1 05
60	1 35

Average price per ton, $1.388, including haulage.

Total number of tons (2,000 pounds), 20,823.

Chicago. Used bituminous coal, 2,000 pounds per ton, as follows:

Brands.	*Tons.*	*Price per ton Delivered.*
Miami No. 2 nut	350	$2.65
Miami nut	3,121	2.10
Illinois nut	36	2.50
Washed nut	50	2.67
Indiana nut	6,687	2.32
Hiawatha nut	41	3.30
Youghiogheny nut and screening	15,696	3.30
Youghiogheny nut and screening	6,332	3.55
Youghiogheny nut and screening	3,156	2.225
Brazil block	43	3.75
Total tons	35,512	

Average price per ton, $2.96.

Detroit. Used bituminous coal; the best Kanawha steam lump, 13,301.25 tons (2,000 pounds), at $2.30 a ton.

South Norwalk. Used bituminous coal, Glenwood, 1,996 tons (2,000 pounds), at $3.18 per ton.

I 47. What other fuel was used?

I 48. State quantity of each kind.

I 49. State cost of each kind.

Allegheny, Chicago, Detroit. No other fuel used.

South Norwalk. Used 238 tons (2,000 pounds) of coal dust (anthracite-culm), at $1.14 per ton: and 9,580 gals. or oil at 3.25c. per gal.

I 50. Give quantity and cost of water used.

Allegheny. The quantity of water used for feed purposes as estimated by the engineers is 30,000,000 gals., which at 10 cents per 1,000 gals., equals $3,000.

Chicago. The water used from city mains as estimated by the engineers is not less than 1,400,000,000 gals. for both feed and condensing purposes (exclusive of consumption by the H. N. May plant, which obtains water from a sewage conduit), which, at the undernoted rates, amounts to $59,640.

The rates charged by the city are:

For each 1,000 gals. not exceeding 165,000 gals. per mo., 10c.

For each additional 1,000 gals. in excess of 165,000 gals., not exceeding 5,000,000 gals. per month, 8c.

For each additional 1,000 gals. in excess of 5,000,000 gals., not exceeding 10,000,000 gals. per month, 6c.

For each additional 1,000 gals. in excess of 10,000,000 gals. per month, 4c.

We have included the above charge for water consumed at regular city water rates. On the basis of actual cost to the water department, however, the amount would be $31,276.00.

The present location of the electric light plants (with the exception of the H. N. May plant) makes the use of water from city mains compulsory. It has been suggested to us, with apparent truth, that it is unlikely that a private corporation consuming such a large volume of water would have located its plants in such positions.

Detroit. Estimated at 1,500,000 gals. per day, obtained free from the river and pumped by the plant.

South Norwalk. Estimated at 7,008,000 gals., at 5c. per 1,000 gals.

I 51. What were the provisions of the contract between the private company and the city for public electric lighting of all kinds? Attach here a copy of the contract.

Allegheny. ———

Chicago. Copy of contract between the Commonwealth Electric Company and the City of Chicago.

"This agreement, made and concluded this first day of January, A. D. 1905, between the Commonwealth Electric Company, a corporation located and doing business in the city of Chicago, county of Cook, and state of Illinois, party of the first part, and the city of Chicago, party of the second part,

Witnesseth, that the said party of the first part for and in consideration of the payments to be to it made by the said city of Chicago, as hereinafter set forth, hereby covenants and agrees to furnish and supply to the said city of Chicago Five Hundred (500), more or less, rated 2,000 c. p. electric lights, or as many as may be required by the city electrician of the said city of Chicago during the whole or a part of the year 1905.

The furnishing and supplying of said rented electric lights must be commenced on the first day of January, A. D. 1905, to progress as follows, namely: Continuously as may be directed by the said city electrician, subject to such changes, or ordered out of service, as he may direct, and be finished and fully completed on or before the 31st day of December, A. D. 1905, the time of commencement, rate of progress and time of completion being essential conditions of this contract.

Should the city electrician of the said city of Chicago deem it proper or necessary in the execution of this contract to make any alterations which shall increase or diminish the expense, such alterations shall not vitiate or annul the contract or agreement hereby entered into, but the said city electrician shall determine the amount by which the expense shall be increased or diminished by any such alteration, such amount to be added to or deducted from the contract price as the case may be.

This agreement shall not be assigned, nor any part of the furnishing and supplying of the said rented electric lights be subcontracted without the written consent of the said city electrician endorsed hereon, and in no case shall such consent relieve the party of the first part from the obligations herein entered into by the same, or change the terms of this agreement.

It is hereby provided and agreed that said rented electric lights shall be furnished and supplied to the said city of Chicago by the said party of the first part strictly in accordance with the specifications hereto attached, and made a part of this contract, and that said furnishing and supplying of said rented lights shall be even, regular and continuous, and if at any time the said party of the first part shall refuse or neglect to furnish and supply such rented lights as shall be specified by the said city electrician, or if in any event the said party of the first part shall fail to proceed in accordance with the requirements and conditions of this agreement, that the said city, by its city electrician, shall have full right and authority to take the furnishing and supplying of said rented electric lights out of the hands of the said party of the first part, and to employ other parties to supply whatever said party of the first part shall fail to furnish and supply, and to deduct the expense thereof from any money that may be due and owing to said party of the first part on account of the furnishing and supplying of said rented electric lights, or to relet the same to other contractors as provided for hereinafter.

And the said party of the first part hereby covenants and agrees to furnish and supply said rented electric lights under the immediate direction and superintendence of said city electrician of the city of Chicago and to his entire satisfaction, approval and acceptance, and it is hereby understood and agreed that for any amount of damage, or price determined by said city electrician to be paid to said city by said party of the first part for any default or for any money paid out by said city on account of said party of the first part in consequence of any defaults, there shall be supplied in payment thereof a like amount of any money that may be due and owing to said party of the first part on account of said furnishing and supplying of said rented electric lights, so far as there may be any such money, and so far as the same shall be sufficient; and if there shall not be sufficient amount retained from the said party of the first part, then and in such case the amount to be paid the said city in consequence of such default shall be a just claim against said party of the first part, to be recovered at law against it in the name of the city of Chicago in any court of competent jurisdiction.

And it is understood and agreed by the parties hereto that no claim whatever for extras will be made by said party of the first part, or for a greater amount of money than is herein stipulated to be paid for each lamp per month, unless some changes in or additions to this contract requiring additional outlay by the said party of the first part shall first have been ordered in writing by the said city electrician.

The said city of Chicago hereby covenants and agrees in consideration of the covenants and agreements in this contract specified to be kept and performed by the said party of the first part, to pay the said party of the first part the sum of One Hundred and Three Dollars ($103.00) per lamp per annum for each 2,000 candle power electric arc lamp so furnished and supplied by the said party of the first part in any of the sections as described in the specifications hereto attached and made a part of this contract, provided such rented service shall have been accepted at the end of each current month by the city electrician of the city of Chicago; payment for all lights furnished under this contract to be made by monthly vouchers at the expiration of each month's service, with any deductions thereon from the above specified rate, as may be stipulated by the said city electrician in accordance with the terms of this contract for inferior or defective service.

It is expressly agreed that all work done, materials furnished, time of performance and payments shall be in full accord with the specifications hereto attached, and this contract is based on the said specifications, and that the said specifications are made a part of this contract as fully as if same had been incorporated herein.

(Here follow the customary authorizations and signatures of the parties.)

SPECIFICATIONS FOR LIGHTING PARTS OF STREETS AND PUBLIC PLACES IN CERTAIN PARTS OF THE CITY OF CHICAGO,

DURING THE YEAR 1905.

Sealed proposals will be received by the city electrician, Room 12, City Hall, Chicago, Illinois, until 11 A. M. Saturday, December 24, 1904, for lighting certain parts of streets in different sections of the city, by any one or all of the different kinds of illuminants hereinafter described, the exact kind of light for the different sections of streets to be determined by the city electrician.

Each proposal must give the city electrician the right to apply the kind of lighting proposed to such streets or parts of streets as may best suit the existing or future conditions of the public lighting service during the year.

Particular attention is directed to the fact that the city is building a new municipal lighting plant, and the consequent installation of electric lights will make unnecessary a considerable portion of the existing rented lights of all character, and the city must have the absolute right to discontinue any part of the lights it may see fit to, and at any time of the year. Proposals must be made on lighting such lights as may be required in any or all, any part of one or parts of all, of the seven sections bounded as follows:

Section 1. On the north by the city limits, on the east by Lake Michigan, on the west by the city limits, on the south by Fullerton avenue.

Section 2. On the north by Fullerton avenue, on the east by Lake Michigan, on the west by city limits, on the south by Chicago avenue.

Section 3. On the north by Chicago avenue, on the east by Lake Michigan, on the west by the city limits, on the south by Twelfth street.

Section 4. On the north by Twelfth street, on the east by Lake Michigan, on the west by city limits, on the south by Thirty-ninth street.

Section 5. On the north by Thirty-ninth street, on the east by Lake Michigan, on the west by city limits, on the south by Sixty-third street.

Section 6. On the north by Sixty-third street, on the east by Lake Michigan, on the west by city limits, on the south by One Hundredth street.

Section 7. On the north by One Hundredth street, on the east by Lake Michigan, on the west by the city limits, on the south by city limits.

The lights required in the above sections will vary, owing to the present municipal lighting system and the proposed extensions, and the proposals must be made to light such streets as are not at present or will not be lighted by the municipal system during the year 1905.

The lights required will be approximately one light to the block for electric lighting, or four lights of gas, or two of gasoline, to the block on improved streets, but the city reserves the right to reduce or increase the total number of lights as it may see fit on account of its municipal lighting or to come within the amount available for paying for said lights within the time specified, and in each case such reduction or increase is made, the said expense shall be reduced or increased pro rata at the agreed rate per light. Such reductions or increases in the number of lights must be made in the lighting such parts of streets in any one, any part of one, or parts of all of the sections hereinafter described as Sections 1, 2, 3, 4, 5, 6, 7, as the city electrician may designate.

ELECTRIC LIGHTING.

Proposals may be made upon furnishing two different kinds of lights—known as open arc series, direct current, and alternating enclosed arc lamps. The proposals must state which system will be furnished.

The electrical energy passed through the carbons of each lamp shall not be less than 450 watts. The voltage for the open arc lamps must not be less than 43 volts or more than 65 volts, and the amperes must be sufficient to make the 450 watts required to be passed through the carbon points.

The best quality of carbons must be used for either class of lamps, and samples must be submitted at any time they may be required by the city. The lamps and all the parts must be kept clean and in good adjustment, must burn steadily and free from flickering and flaming.

Each lamp must be of the best manufacture for the purpose of street lighting, and must be provided with all the necessary globes, shades, reflectors, or other appliances that are used on lamps of similar character, or that would materially increase the lighting efficiency of the lamps.

Each lamp must be erected at such location as may be designated and at a height of not less than 22 feet or more than 35 feet from the ground.

The hours of service must be from early dusk to daylight each and every night in the year. Deductions in bills must be made in proportion to the rate charged for each light that fails to burn the full schedule time as above required, and for each lamp that does not consume the required number of watts under the conditions prescribed, a like deduction must be made.

The voltage for the enclosed arc lamps shall not be less than 68 volts, or more than 80 volts, and the amperes sufficient to make 450 watts required to be used through the carbon points.

NOTICE.

Each proposal must be accompanied with a certified check for the sum of $2,500, such check to be made payable to the order of the city electrician. This check will be forfeited to the city if the contractor fails to enter into the contract and give bond for the full amount of the contract within five (5) days after being notified that the contract has been awarded to him for lighting any part of the city under the conditions prescribed in these specifications.

The time that the lights hereinbefore specified are to be furnished and operated is from the first day of January, 1905, until the first day of January, 1906, and all bids must be made in accordance.

The city reserves the right to extend the time of starting any of the lights until the first day of March, 1905, in which case the contract should read from the day the lights are started until the first day of January, 1906.

The city reserves the right to extend the contract for a period of three (3) months or any part thereof after January 1st, 1906, by giving fifteen (15) days notice of its intention so to do. The city electrician reserves the right to reject any or all bids or to accept bids or any part of a bid as may be deemed by him to be for the best interests of the city of Chicago.

EXTRACT FROM CONTRACT WITH CHICAGO SUBURBAN WATER AND LIGHT COMPANY.

Date. January 1, 1905.

Number of lamps. 128, more or less, rented, 2,000 c. p. electric lights, or as many as may be required, during the whole or part of the year 1905.

Price. $8.55 per lamp per month, payment to be made by monthly vouchers at the expiration of each month's service as rendered.

Conditions. The general terms of the above contract are the same as those of the contract with the Commonwealth Electric Company.

MEMO.

The city rented 128 lamps under the above contract from January 1, 1905, to June 30, and two additional lamps for 15 days in June; 130 lamps during July, August, September and first day of October, when contract was discontinued. The total cost was $9,945.30.

Detroit, South Norwalk. ———

I 52. Number of years for which contract is made, and date when made.

I 53 and 54. Total number of hours each style of lamp was lighted during that year.

Allegheny. Arc lamps, 3,888 hours; incandescent, continuous service.

Chicago. Contracts were made for one year from January 1, 1905. Number of hours per year, estimated, 4,015. This figure is estimated by Mr. Carroll, superintendent, no records having been kept. The contracts require that the lighting shall be "from dusk to daylight."

Detroit. Arc lamps, 3,774½ hours, equals 4,780,397 K. W. H. It is impossible to state more for the incandescent lamps than the number of K. W. hours as per meter readings at plant, which amount to 1,104,144 K. W. H.

South Norwalk. Street Lighting. The 109 arc lamps of the street service are lighted from dusk to dawn, except when there is sufficient moonlight to render service unnecessary, but no regular moonlight schedule is followed. On Saturday evenings the lamps are lighted even if there be sufficient moonlight. The average number of nights the lamps were lighted during the year was 345, and the average hours per lamp, 2,883.

Bridge Lighting. The incandescent lamps for lighting sidewalks under railroad bridges are lighted from dusk to dawn every night. There are 20 lamps of 8 c. p. per lamp in service, and the average hours per lamp per year are 4,000.

Commercial Lighting and Power. These services are continuous, 24 hours per day, except between one hour after sunrise and one hour before sunset on Sundays. The lamps connected, 16 c. p., equivalent, approximate, 7,495. The H. P. capacity of motors connected is 598.

I 55. Number of lamps of each style.

I 56. Price per year of each style.

Allegheny. At February 28, 1905, there were 1,499 arc lamps in service; 9,032 sixteen candle power and 658 thirty-two candle power incandescent lamps; and 31 enclosed arc lamps. The average number of arc lamps in use throughout the year was 1,486.

Chicago. (*a*) At December 31, 1905, the number of arc lamps lighted by the Commonwealth Electric Company was 522. Price, $103 per lamp per annum.

(*b*) The Commonwealth Electric Company also lighted during January, February and March, 25 lamps. Price 1c. per lamp hour, less discount of 82 per cent. in 10 days.

(*c*) The Chicago Suburban Water and Light Company lighted 128 arc lamps from January 1 to June 15, and 130 from June 15 to October 1. Price, $102.60 per lamp per annum.

(*d*) The Commonwealth Electric Company also supplied current through the municipal station (R. A. Waller plant) from June 27 to December 31. The number of lamps thus supplied at December 31 was 211. The price was $103 per lamp per annum, less allowance of $17 per lamp for carbons, trimming, maintenance and repairs, which expense is incurred by the electric light bureau.

Detroit. Arc lamps, 3,005; incandescent, 14,696; constant potential arcs, 17.

South Norwalk. Street Lighting. 109 street arcs.

Bridge Lighting. 20 lamps of 8 c. p. per lamp.

Commercial Lighting. 1 arc on street service; 70 commercial arcs, 6,739 equivalent 16 c. p. incandescent.

Street lamps, $60 per year. At the time this price was fixed it was regarded as the approximate cost to the electrical works. All others metered except public departments and a few other exceptions.

I 57. Did these prices include renewals and repairs?

Allegheny, Detroit. ———

Chicago. Yes, in the case of *a*, *b* and *c*, questions I 55 and 56.

South Norwalk. Yes.

I 58. Were there any other charges for public lighting?

Allegheny. Yes. There were 20 gas lamps in service, the total cost of which was $709.31.

Chicago, South Norwalk. No.

Detroit. ———

I 59. Did the municipality own the lamp posts?

Allegheny. Yes.

Chicago. Yes, except in the case of the contracts, where the lamps were owned and lighted by the Commonwealth Electric Company and the Chicago Suburban Water and Light Company. (*a, b* and *c,* Qs. I 55, 56.)

NOTE.—Number of arc lamps at December 31, 1905, and the average number throughout the year.

ARC LAMPS IN USE AT DECEMBER 31, 1905.

(*a*) Owned and operated by the city:

Street arc lamps	6,357
Arc lamps at electric light plants	47
Arc lamps at pumping stations	70
Arc lamps at fire dep't engine houses	21
	6,495

(*b*) Owned by city; current supplied by Commonwealth Electric company through municipal station (R. A. Waller plant) at $103 per lamp per annum, less allowance of $17 per lamp for trimming, maintenance and repairs, which is done by the electric light bureau	211
(*c*) Street arc lamps owned and current supplied by the Commonwealth Electric Company at $103 per lamp per annum	506
(1/3 joint) $103 per lamp per annum	13
(½ joint) $103 per lamp per annum	3
	522

Average number of arc lamps in use throughout the year.

(*a*) Owned and operated by the city, 5,743; lamp hours, 23,058,267.

(*b*) Owned by city current supplied by Commonwealth Electric Co., 109; lamp hours, 435,219.

(*c*) Rented lamps, 643.

Note. All nominal 2,000 c. p.

Detroit. The public lighting commission owns the lamp posts with the exception of 43, which are rented from the Detroit United Street Railway Company at $1 each per year.

They are known as:

Single trolley poles, 22.

Double trolley poles, 21.

South Norwalk. Yes.

J—CAPITAL STOCK AND BONDS.

J 1. As of date (end of last fiscal year).

Allegheny. February 28, 1905.

Chicago. December 31, 1905.

Detroit. June 30, 1905.

South Norwalk. January 1, 1906.

J 2-10. All of the four plants under consideration being municipal plants, questions J 2 to 10 inclusive, relating to stock issues, do not apply.

J 11. Amount of bonds authorized by charter or statute.

Allegheny. Under an act entitled "Commonwealth of Pennsylvania, 1901," bonds may be issued to an amount not exceeding two per cent. of taxable property, and, with the consent of the people, seven per cent.

Chicago. Under the "Statutes of the State of Illinois," constitution of 1870, Art. 9, Sec. 12, "No county, city, township, school district, or other municipal corporation shall be allowed to become indebted in any manner or any purpose to an amount, including existing indebtedness, in the aggregate exceeding five per centum of the value of the taxable property therein, to be ascertained by the last assessment for state and county taxes previous to the incurring of such indebtedness. Any county, city, township, school district, or other municipal corporation incurring any indebtedness as aforesaid shall, before or at the time of doing so, provide for the collection of a direct annual tax sufficient to pay the interest on such debt as it falls due, and also to pay and discharge the principal thereof within twenty years from the time of contracting the same."

Detroit. $800,000, authorized by act of the legislature.

South Norwalk. According to the city charter the debt limit of the city shall not exceed five per cent. of the assessable valuation of assessable property, except that this provision does not apply to the municipal water works.

J 12. Amount of bonds authorized by municipality or vote of company.

Allegheny. The following are the dates of the passing of each ordinance and the amounts authorized:

March 6, 1891	$160,000
May 23, 1893	100,000
January 4, 1901, and amendment	100,000
July 21, 1901	40,000
	$400,000

Chicago. No bonds were ever issued specifically for the electric light bureau. Part of the issue of $3,000,000 of permanent improvement bonds have, however, been used for extension and construction of the system. These bonds were issued under authority of an ordinance of July 18, 1904, are dated July 1, 1904, and bear interest at four per cent. per annum. They are being paid off on the amortization plan, $168,000 maturing every year from January 1, 1907, to January 1, 1923, the balance, $144,000, falling due on January 1, 1924. They were issued for the purpose of providing funds for making permanent improvements to the city.

The following statement shows the amount of these bonds expended on account of the electric light bureau to December 31, 1905:

1904, *"Removing poles and wires on streets to be improved"	$7,843 70
"Extraordinary expense, extending electric light system"	73,662 84
1905, *"Removing poles and wires on streets to be improved"	56,841 16
"Extraordinary expense, extending electric light system"	257,036 83
Total	$395,384 53

Detroit. $650,000.

South Norwalk. $42,500.

J 13. Amount of bonds issued.

Allegheny	†$400,000 00
Detroit	650,000 00
South Norwalk	42,500 00

Chicago. For J 13, 14, 15, 16, 17, 18. ———

J 14. Amount of bonds paid.

Allegheny	$9,000 00
Detroit and *South Narwalk*	......

J 15. Amount of bonds outstanding.

Allegheny	$391,000 00
Detroit	650,000 00
South Norwalk	42,500 00

---

*The cost of construction of underground work is charged to this account, but owing to all underground work being utilized for police and fire alarm telegraph as well as for electric light wires, and no separate accounts carried on the books, these figures have been estimated. No interest has been charged against the bureau for any portion of the bond issue.

† See also J. 18.

J 16. *Bonds Issued.* *Allegheny.*

Date of Issue.	*When Due.*	*Face Value.*	*Amount Received.*	*Rate of Interest.*	*Security.*	*How to be Paid.*
(a) April 1, 1891	1921	$1,000 00	$161,600 00*	4 per cent.	Assessments	U. S. currency
(b) Oct. 1, 1893	1913 (redeemable) 1923 (payable)	.... 1,000 00	.... 14,000 00	.... 4 per cent.	.... Assessments	.... U. S. currency
(c) July 1, 1894 ...	1914 (redeemable) 1924 (payable)	.... 1,000 00	.... 91,396 50*	.... 4 per cent.	.... Assessments	.... U. S. currency
(d) Oct. 1, 1901	1902 to 1921, $3,000 due each year, and 1922 to 1931, inclusive, $4,000 due	1,000 00	102,625 00*	3½ per cent.	Assessments	U. S. currency
(e) Aug. 1, 1904	1909, Aug. 1, $4,000, and every year thereafter until 1918.	1,000 00 or multiples	40,000 00	4 per cent.	Assessments	U. S. currency
			Detroit.			
Aug 15, 1893	30 years	$600,000 00	$600,000 00†	4 per cent	City of Detroit	In lump sum at maturity, $600,000, in gold
July 7, 1896	30 years	50,000 00	50,000 00†	....	....	In lawful money.
			South Norwalk.			
(a) 1893	1935	$22,500 00	$22,500 00	4 per cent. payable semi-annually.	The credit of the city	U. S. currency
(b) 1898	1928	20,000 00	20,000 00	4 per cent. payable semi-annually.	The credit of the city	U. S. currency

---

* The figures entered as "amount received" are arrived at on basis of 1 per cent., 6.275 per cent. and 2.625 per cent. premiums, as per report.

† In addition $27,540 and $5,039.50, respectively, were received as premiums on the above issues and placed to the sinking fund of the city.

J 17. Explain how each issue of bonds was disposed of, whether private sale, public auction, bond dividend, etc.

Allegheny. (As designated in J 16.)

(*a*) Private sale—advertisement.
(*b*) Private sale—advertisement.
(*c*) Advertisement.
(*d*) Advertisement.
(*e*) Sold to sinking fund commission.

Detroit. The issue of $600,000 was disposed of by public auction, the bonds being advertised for sale. The charter directs that bonds are not to be sold under par value, but when the proposals were opened on June 13, 1893, none of the tenders were for par value, and therefore no sale took place at that time. On December 22, 1893, new bids were received, and the bonds ordered sold on the following day at the premium of $27,540 for the entire issue of $600,000, the issue being dated August 15, 1893. On February 27, 1894, the city treasurer reported a delivery of the bonds to the successful bidder.

The issue of $50,000 was also disposed of by public auction, on July 14, 1896, at a premium (including interest, $38.35) of $5,077.85.

South Norwalk. Public sale.

J 18. State amount and character of other funded debts, if any.

Allegheny. Temporary loan bonds issued January 1, 1904, particulars as follows:

The issue of $41,000 temporary loan bonds is part of an issue of $84,000 authorized by ordinance dated December 17, 1903, to meet deficiencies in appropriations, i. e.,

Bureau of public lighting, Item 5	$20,000
Bureau of public lighting, Item 3	21,000
Bureau of water, Item 4	43,000
	$84,000

These bonds are payable as follows:

January 1, 1905	$16,000
January 1, 1906	16,000
January 1, 1907	16,000
January 1, 1908	16,000
January 1, 1909	20,000
	$84,000

Face value, $1,000 or multiples; amount received, $41,000; rate of interest, 4 per cent.; security, assessments; payable in U. S. currency.

Detroit. None.

South Norwalk. Notes: $31,000, as under:

*Original Date of Issue.**	*When Due.*	*Face Value.*	*Amount Received.*
(a) 1900	April 19, 1906.....	$5,000	$5,000
(b) 1903	April 19, 1906.....	4,000	4,000
....	March 11, 1906....	2,000	2,000
....	March 28, 1906....	3,000	3,000
....	Feb. 23, 1906.....	3,000	3,000
....	March 23, 1906....	4,000	4,000
(c) 1905	Feb. 10, 1906.....	10,000	10,000
		$31,000	$31,000

J 19. If funds have been secured from any other sources for the construction and extension of plant, give amounts, dates and sources fully.

Allegheny. Payments on account of the construction and extension of the plant have also been met from annual appropriations.

Chicago. In consideration of privileges granted to certain street railway companies by the city of Chicago, including the right to operate their cars by electricity on the overhead trolley system on certain specified streets, the companies agreed to pay to the city the amounts shown on page 835.

Detroit. Funds have not been secured from any other sources.

South Norwalk. Funds have not been secured from any other sources except for miscellaneous extensions made from current revenue.

J 20. What provisions have been made for payment of liabilities when due?

Allegheny. There are sinking fund provisions for payment of bond issues a, b, and c, by annual assessments (See J 16), and annual appropriations by the council of the city for payment of other liabilities.

Chicago. Appropriations are made from year to year.

Detroit. The resources of the sinking fund of the city of Detroit, amounting to $2,359,733.66, include $25,000 of public lighting bonds.

South Norwalk. The notes are being gradually paid off from surplus funds.

J 21. What provisions have been made for payment of interest on bonds?

Allegheny. For payment of interest on bonds there is assessed an annual tax on all property of the city made taxable by law.

Chicago. ———

Detroit. Amount required for interest on bonds is raised by general taxation.

South Norwalk. The current revenue is depended upon to meet interest charges.

---

* These notes are renewed from time to time until paid; bore 5 per cent interest; were secured by the credit of the city, and payable in United States currency.

PAYMENTS TO CITY OF CHICAGO BY STREET RAILWAY COMPANIES.

Date of Ordinance.	*Name of Company.*	*Amounts Payable and When Payable.*	*Purpose.*
1894, April 30	North Chicago Street Railroad Company*	$10,000, at the expiration of the first year. $15,000, at the expiration of second year.	Extension of electric light system.
	West Chicago Street Railroad Company	$20,000, at expiration of third year. $25,000, at expiration of fourth year and every following year.	
1894, July 16	Chicago City Railway	$10,000 Jan. 1, 1895. 10,000, Jan. 1, 1896. 10,000, Jan. 1, 1897. 10,000, Jan. 1, 1898. 10,000, Jan. 1, 1899. 10,000, Jan. 1, 1900. 10,000, Jan. 1, 1901. 10,000, Jan. 1, 1902. 10,000, Jan. 1, 1903. 10,000, Jan. 1, 1904. ———$100,000	For erection and maintenance of electric arc lights along the streets where Chicago City Railway Co. runs its cars.
1895, Feb. 4	West Chicago Street Railroad Company*	$5,000, at the expiration of each year for period of 20 years from date of passage of ordinance.	For extension of electric light system.

---

* The North Chicago Street Railroad Company and the West Chicago Street Railroad Company are now merged in the Union Traction Company, which continues to pay $30,000 per annum, as required above.

K—ASSETS.

Allegheny.

K 1.	As of date (end of last fiscal year).		February 28, 1905.
2.	Cash on hand. (Bond issues unexpended).		$20,473 71
3.	Notes receivable		......
4.	Sundry accounts due		......
5.	Investments (giving particulars)		......
6.	Patent rights		......
7.	Office furniture		200 00
8.	Land—		
	(*a*) Now used for electric lighting purposes (E)	$10,000	
	(*b*) Not used for electric lighting purposes	......	
			10,000 00
9.	Buildings		(E) 31,500 00
10.	Steam plant		76,465 72
11.	Water power plant		......
12.	Electric plant		57,700 40
13.	Lines—		
	(*a*) Overhead	$50,104 82	
	(*b*) Underground	......	
			50,104 82
14.	Transformers		4,650 00
15.	Meters		285 60
16.	Services		......
17.	Lamps (arc)		27,320 39
18.	Other permanent works (teams, tools and other accessories)		630 00
19.	Fuel on hand		......
20.	Carbons on hand		......
21.	Arc lamps on hand		......
22.	Incandescent lamps on hand		......
23.	Globes and other electric fixtures on hand		......
24.	Motors on hand		......
25.	Miscellaneous supplies on hand		......
26.	Sinking funds:		
	Amount as per contra	$108,466 49	
	Electric light plant bonds; amount of fire loss recovered held by sinking fund commission	4,482 82	
			112,949 31
27.	Other current assets		......
28.	Other capital assets		......
28a.	Deficit		157,177 86
29.	Total assets		$519,457 81

Value of the fixed assets at Feb. 28, 1905, as shown by the books	$529,924 83
Value of the fixed assets at Feb. 28, 1905, as appraised	258,856 93
Difference	$271,067 90

Chicago.

K 1.	As of date (end of last fiscal year), December 31, 1905.		
2.	Cash on hand		......
3.	Notes receivable		......
4.	Sundry accounts due		$5,740 00
5.	Investments (giving particulars)		......
6.	Patent rights		......
7.	Office furniture		500 00
8.	Land—		
	(*a*) Now used for electric lighting purposes	$49,501 84	
	(*b*) Not used for electric lighting purposes	......	
			49,501 84
9.	Buildings		88,793 98
10.	Steam plant		213,740 77
11.	Water power plant		......
12.	Electric plant		69,687 45
13.	Lines—		
	(*a*) Overhead	$148,425 25	
	(*b*) Underground	613,913 86	
			762,339 11
14.	Transformers (included elsewhere)		......
15.	Meters (included elsewhere)		......
16.	Services		......
17.	Lamps (arc lamps in use and on hand)		95,358 75
18.	Other permanent works (teams, tools and other accessories		3,150 00
19.	Fuel on hand		231 33
20.	Carbons on hand		4,911 15
21.	Arc lamps on hand (See K 17)		......
22.	Incandescent lamps on hand		......
23.	Globes on hand		450 00
24.	Motors on hand		......
25.	Miscellaneous supplies on hand, construction material	$32,635 28	
	Miscellaneous operating supplies	700 00	
			33,335 28

26.	Sinking fund		......
27.	Other current assets. Funds held by city against "special deposits" unexpended		$34,319 74
28.	Other capital assets		......
29.	Total assets		$1,362,059 40
	Value of fixed assets as shown by the books at Dec. 31, 1905		*$1,987,169 57
	Value of fixed assets as appraised Dec. 31, 1905		1,283,071 90
	Difference		$704,097 67

Detroit.

K 1.	As of date (end of last fiscal year). June 30, 1905.		
2.	Cash on hand		$35,079 94
3.	Notes receivable		......
4.	Sundry accounts due		5,368 49
5.	Investments (giving particulars)		......
6.	Right to track built at expense of, but not owned by city		5,124 08
7.	Office furniture		300 00
8.	Land—		
	(*a*) Now used for electric lighting purposes	$63,125 00	
	(*b*) Not used for electric lighting purposes	......	
			63,125 00
9.	Buildings and wharf		79,755 70
10.	Steam plant		83,953 48
11.	Water power plant		......
12.	Electric plant		37,181 84
13.	Lines—		
	(*a*) Overhead	$212,148 27	
	(*b*) Underground	197,060 04	
			409,208 31
14.	Transformers: Station	$8,621 55	
	Line transformers	6,664 64	
			15,286 19
15.	Meters		2,501 10
16.	Services		......
17.	Lamps: arc	$50,628 71	
	Incandescent	1,836 24	
			52,464 95
18.	Other permanent works		8,250 73
19.	Fuel on hand		481 30

---

* This figure includes the cost of underground construction work, a portion of which should properly be chargeable to the police and fire alarm telegraph bureau. (See answer to J 12.)

20.	Carbons on hand		$2,350 67
21.	Arc lamps on hand		......
22.	Incandescent lamps on hand		433 07
23.	Globes and other electric fixtures on hand		2,212 03
24.	Motors on hand		......
25.	Miscellaneous supplies on hand		
	Oils	$21 74	
	Waste	3 57	
	Dynamo brushes	62 40	
	Estimated stock in storeroom	900 00	
			987 71
26.	Sinking fund		......
27.	Other current assets		......
28.	Other capital assets		......
29.	Total assets		$804,064 59

South Norwalk.

K 1.	As of date (end of last fiscal year). January 1, 1906.		
2.	Cash on hand		$308 49
3.	Notes receivable		......
4.	Sundry accounts due		3,397 44
5.	Investments (giving particulars)		......
6.	Patent rights		......
7.	Office furniture		150 00
8.	Land—		
	(*a*) Now used for electric lighting purposes	$2,000 00	
	(*b*) Not used for electric lighting purposes	......	
			2,000 00
9.	Buildings		5,750 00
10.	Steam plant		29,854 12
11.	Water power plant		......
12.	Electric plant		14,791 34
13.	Lines—		
	(*a*) Overhead	$16,344 85	
	(*b*) Submarine	574 77	
			16,919 62
14.	Transformers		......
15.	Meters		8,793 30
16.	Services (included under lines overhead)		......
17.	Lamps (arc, $3,201.57; incandescent, $859.68)		4,061 25
18.	Other permanent works (teams, tools and other accessories)		420 00
19.	Fuel on hand		172 25
20.	Carbons on hand		22 40
21.	Arc lamps on hand		......
22.	Incandescent lamps on hand		129 50

23.	Globe and other electric fixtures on hand....	$15 00
24.	Motors on hand........................	......
25.	Miscellaneous supplies on hand............	24 74
26.	Sinking fund	......
27.	Other working assets (interest and insurance paid in advance)................	433 00
28.	Other capital assets.....................	......
29.	Total assets	$87,242 45

K 30. Do the values above given represent the original cost of the present assets, their present market value, or cost of duplication?

K 31. If none of these, state how values were fixed.

Allegheny.

2. Actual value.

7. Estimated present market value.

8. Estimated present market value as stated by engineers.

9, 10, 12, 13, 14, 15, 17 and 18. "Present cost to replace less deductions for age and progress of art," as appraised by engineers.

26. Actual value as shown by the books.

Chicago.

4. Realizable value.

7. Estimated present market value.

8. Estimated present market value as stated by engineers.

9, 10, 12, 13, 17, 18 and 25. "Present cost to replace less deductions for age and progress of art," as appraised by engineers.

19, 20 and 23. Cost value.

27. Actual value.

Detroit.

2. Actual value.

4. Realizable value.

6. Estimated value as stated by engineers.

7. Estimated present market value.

8. Estimated present market value as stated by engineers.

9, 10, 12, 13, 14, 15, 17 and 18. "Present cost to replace, less deductions for age and progress of art," as appraised by engineers.

19, 20, 22, 23 and 25. Cost value.

South Norwalk.

2. Actual value.

4. Realizable value.

7. Present market value.

8. Estimated present market value as stated by engineers.

9, 10, 12, 13, 15, 17 and 18. "Present cost to replace, less deductions for age and progress of art," as appraised by engineers.

19, 20, 22, 23 and 25. Cost value.

27. Value as a "going concern."

L—LIABILITIES.

		Allegheny.	*Chicago.*	*Detroit.*	*South Norwalk.*
L 1.	As of date (end of last fiscal year)	Feb. 28, 1905.	Dec. 31, 1905.	June 30, 1905.	Jan. 1, 1906.
2.	Capital stock	....	....	....	....
3.	Bonds	$391,000 00	....	$650,000 00	$42,500 00
3a.	Temporary loan	33,190 48	....	....	....
4.	Notes payable	....	....	....	31,000 00
5.	Unpaid bills	11,645 89	$32,494 45	20,553 90	12,412 26
6.	Deposits by customers	....	....	....	....
7.	Unpaid dividends	....	....	....	....
8.	Interest due but not paid	....	....	....	....
9.	Interest accrued but not due	5,154 95	....	....	500 00
10.	Reserve fund	....	....	....	....
11.	Depreciation fund	....	....	....	....
12.	Other funds (giving particulars)	*108,466 49	†34,319 74	....	....
12a.	Other liabilities	....	....	....	....
13.	Surplus	....	1,295,245 21	133,510 69	830 19
14.	Total	$549,457 81	$1,362,059 40	$804,064 59	$87,242 45

---

* Sinking fund for redemption of—

(a) $160,000 bonds of issue of 1891	$74,666 63
(b) 14,000 bonds of issue of 1893	5,133 26
(c) 86,000 bonds of issue of 1894	28,666 60
	$108,466 49

† "Special deposits"—

(1) For extension of electric lighting system	$25,317 10
(2) For extending and maintaining electric arc lamps along right of way of Chicago City Railway Company	9,002 64
	$34,319 74

M—RECEIPTS.

(Before dealing with additional items detailed in answer to Q. I 28.)

Allegheny. This schedule for Allegheny, M 1-16 inclusive, indicates no receipts.

	Chicago.	*Detroit.*	*South Norwalk.*
M 1. For year ending............	Dec. 31, '05.	June 30, '05.	Jan. 1, '06.
2. Private arc lights, unmetered	....	....	*$66 00
Lincoln Park Commissioners, 18 arc lights on streets and boulevards.	$1,105.92	....	....
Pittsburg, Cincinnati, Chicago & St. Louis Railroad Co., rental of seven joint electric arc lamps, at $35..........	245 00	....	....
Rental of 3 individual electric arc lamps, at $70	210 00	....	....
Chicago & Northwestern Railroad Co., same as foregoing	455 00	....	....
Northwestern Elevated Railroad Co., rental of 69 arc lights at streets intersecting under their structure, at $70.....	4,830 00	....	....
3. Private incandescent, unmetered	....	....	1,001 85
4. Private lighting, metered....	....	5,394 57	18,213 06
5. Public arc lights (109 lamps, at $60 per lamp).........	....	....	6,540 00
6. Public incandescent lights....	....	....	698 28
7. Public power	....	....	....
8. Commercial power	....	....	7,739 22
9. Electric railway power......	....	....	....
10. Sale of current other than noted	....	....	....
11. Rents of meters............	....	....	....
12. Rents of motors, fixtures and appliances	....	....	....
12a. Rents of track, poles and conduits	....	3,249 31	....
13. Net profit from sale of fixtures and appliances......	....	....	....
14. Penalties on delinquent bills.	....	....	....
15. Other receipts—			
Sale of old material.....	1,562 06	2,909 56	....
Sale of steam for heating railroad cars	....	....	13 30
16. Total receipts.....	$8,407 98	$11,553 44	$34,271 71
Work done for other departments of the city	....	$1,524 61	....
Less amounts charged city departments	....	$1,524 61	....

---

* One arc light.

N—EXPENSES.

(Before dealing with additional items detailed in answer to Q. I 43.)

Allegheny.

N 1. Fiscal year ended February 28, 1905.

Production.

2.	Fuel		$28,902 93
3.	Oil and waste		2,456 61
4.	Water for boilers		......
5.	Water power or water rights		......
6.	Wages and salaries		28,511 49
7.	Maintenance, repairs and renewals—		
	(*a*) Buildings	$1,451 97	
	(*b*) Steam plant	7,984 90	
	(*c*) Water power plant	......	
	(*d*) Electric plant	3,437 61	
			12,874 48
8.	General expenses		450 04
9.	Current purchased		......
10.	Total production		$73,195 55

Distribution.

11.	Wages and salaries—		
	(*a*) Street arc lamps	$9,440 03	
	(*b*) Street incandescent lamps	......	
	(*c*) General distribution	1,759 31	
			$11,199 34
12.	Expense beyond meter		......
13.	Supplies, tools and appliances		677 63
13*a*.	Carbons		6,325 02
14.	Maintenance, repairs and removals—		
	(*a*) Lines overhead	$10,424 81	
	(*b*) Lines underground	......	
	(*b*1) Primary line fixtures	261 54	
	(*b*2) Secondary line fixtures	330 25	
	(*c*) Transformers	875 08	
	(*d*) Meters	......	
	(*e*) Services	......	
	(*f*) Commercial arc lamps	......	
	(*g*) Commercial incandescent lamps	......	
	(*h*) Public (street, etc.) lamps	3,391 33	
	(*i*) Public incandescent lamps	1,974 34	
	(*j*) Motors, fixtures and appliances rented	......	
			17,257 35
15.	Miscellaneous		601 44
	Total		$36,060 78
	Deduct fire loss—supplies, tools, etc		7,447 63
16.	Total distribution		$28,613 15

General.

17.	Directors' allowances		......
18.	Salaries of officers, committee, commissioners		......
19.	General office salaries		$1,678 86
20.	Rent of offices		......
21.	Office expenses		328 65
22.	Legal expenses		......
23.	Injuries, damages and claims		......
24.	Licenses and royalties		......
25.	Insurance, fire and boiler		972 22
26.	Bad debts		......
27.	Net loss on sales of meters, engines and other appliances		......
28.	New business—		
	(*a*) Advertising and soliciting	....	
	(*b*) Appliances and fittings	....	
			......
29.	Other general expenses		143 51
30.	Total general expenses		$3,123 24
31.	Total expenses		$104,931 94

Resume.

Total receipts	......
Total expenses	$104,931 94
Balance to profit and loss	$104,931 94

Chicago. N—EXPENSES.

(Before dealing with additional items detailed in answer to Q. I 43.)

N 1. Fiscal year ended December 31, 1905.

Production.

2.	Fuel		$105,093 74	
3.	Oil and waste		4,211 76	
4.	Water for boilers		....	
5.	Water power or water rights		....	
6.	Wages and salaries		52,075 76	
7.	Maintenance, repairs and renewals:			
	(*a*) Buildings	$2,102 06		
	(*b*) Steam plant	13,892 87		
	(*c*) Water power plant	....		
	(*d*) Electric plant	3,268 38		
			19,263 31	
8.	General expenses		2,135 13	
9.	Current purchased		8,874 06	
9a.	Rented lights		64,881 14	
10.	Total production			$256,534 90

Distribution.

11.	Wages and salaries:		
	(*a*) Street arc lamps	$55,228 23	
	(*b*) Street incandescent lamps	....	
	(*c*) General distribution	1,523 46	
			$56,751 69

12. Expense beyond meter		....	
13. Supplies, tools and appliances		....	
13a. Carbons		$18,764 06	
14. Maintenance, repairs and removals:			
(*a*) Lines overhead (E). (See note.)	$5,871 91		
(*b*) Lines underground (E). (See note.)	18,108 24		
(*c*) Transformers	....		
(*d*) Meters	....		
(*e*) Services	....		
(*f*) Commercial arc lamps	....		
(*g*) Commercial incandescent lamps	....		
(*h*) Public (street, etc.) lamps	18,400 78		
(*i*) Public incandescent lamps	....		
(*j*) Motors, fixtures, appliances rented	....		
		42,380 93	
15. Miscellaneous (includes ground rent, $1,250.00)		1,790 48	
16. Total distribution			$119,687 16
General.			
17. Directors' allowances		....	
18. Salaries of officers, committee, commissioners		....	
19. General office salaries		$1,329 54	
20. Rent of offices		....	
21. Office expenses		249 56	
22. Legal expenses		....	
23. Injuries, damages, claims		1,032 83	
24. Licenses and royalties		....	
25. Insurance—Fire, boiler, accident		....	
26. Bad debts		....	
27. Net loss on sales of meters, engines and other appliances		....	
28. New business:			
(*a*) Advertising and soliciting	....	....	
(b) Appliances and fittings	....	....	
29. Other general expenses		63 25	
30. Total general expenses			2,675 18
31. Total expenses			$378,897 24

Resume.

Total receipts	$8,407 98
Total expenses	378,897 24
Balance to profit and loss	$370,489 26

(General note to "expenses.") Administration salaries and expenses. In the answer to Q. I 23, we mention that one account was carried on the books for the administration salaries and expenses of the department. As proper charges against the bureau we have taken 25 per cent. of the salaries of the city electrician and clerks employed on the work of the department, and $820, being a proportion of two salaries carried on the payrolls of other bureaus, and 25 per cent. of the expenses, as applicable to the bureau. The management only considers 15 per cent of the administration salaries and expenses, and the $820 mentioned above; but this in our opinion is an insufficient charge.

The respective charges are as follows:

Charged by management	$2,789 55
Charge as adjusted	3,727 57
Difference	$938 02

(Note to N 14 *a* and *b*.) The total expenditure under these two headings (*a*—lines overhead, *b*—lines underground) has been distributed to each head in estimated proportions. No distinction was made on the books of the bureau between overhead and underground work, one account only being carried. As it is now impossible to divide the payrolls and certain sundry items of material between the overhead and underground work, we have charged 75 per cent. to "underground maintenance and repairs" and 25 per cent. to "overhead maintenance and repairs." This we are informed is a fair distribution. We understand that throughout the year certain material, such as cable, wire, etc., which had been charged to construction account, was used for the purpose of maintenance and replacements, and no transfer made from the construction account to the operating account. At our request a statement was prepared by the store-keeper from the daily reports showing the total amount of wages and material used in maintenance, repairs and renewals. The amount shown by his statement was $4,509.62 more than that shown by the books, and this difference we have charged to operating account.

Detroit. N—EXPENSES.

(Before dealing with additional items detailed in answer to Q. I 13.)

N1. Fiscal year ended June 30, 1905.

Production.

2 Fuel		$30,517 17
3 Oil and waste		1,608 50
4 Water for boilers		332 52
5 Water power or water rights		....
6 Wages and salaries		32,435 29
7 Maintenance, repairs and renewals:		
(*a*) Buildings, track and dock	$1,747 07	
(*b*) Steam plant	4,176 02	
(*c*) Water power plant	....	
(*d*) Electric plant	1,211 44	
		7,134 53
8 General expense		880 02
9 Current purchased		....
10 Total production expenses		$72,908 03

Distribution.			
11. Wages and salaries:			
(*a*) Street arc lamps	$13,893 69		
(*b*) Street incandescent lamps	....		
(*c*) General distribution	3,199 90		
		$17,093 59	
12. Expense beyond meter		....	
13. Supplies, tools and appliances		1,358 65	
13a. Carbons		7,308 94	
14. Maintenance, repairs and removals:			
(*a*) Lines overhead (*b*) Lines underground	7,363 84		
(*c*) Transformers	193 79		
(*d*) Meters	....		
(*e*) Services	412 57		
(*f*) Commercial arc lamps	....		
(*g*) Commercial incandescent lamps	....		
(*h*) Public (street, etc.) lamps	8,556 66		
(*i*) Public incandescent lamps	1,434 45		
(*j*) Motors, fixtures, appliances rented	....		
		17,961 31	
15. Miscellaneous		33 05	
16. Total distribution expense			$43,755 54
General.			
17. Directors' allowances		....	
18. Salary of secretary		$1,649 92	
19. General office salaries		1,935 15	
20. Rent of offices		....	
21. Office expenses		747 54	
22. Legal expenses		....	
23. Injuries, damages and claims		329 73	
24. Licenses and royalties		....	
25. Insurance, boiler		125 00	
26. Bad debts		....	
27. Net loss on sales of meters, engines and other appliances		....	
28. New business:			
(*a*) Advertising and soliciting	....		
(*b*) Appliances and fittings	....		
		....	
29. Other general expenses		....	
30. Total general expenses			4,787 34
31. Total expenses			$121,450 91

Resume.

Total receipts	$11,553 44
Total expenses	121,450 91
Balance	$109,897 47

South Norwalk. N—EXPENSES.

(Before dealing with additional items detailed in answer to Q. I 43.)

N1. Fiscal year ended January 1, 1906.

Production.			
2. Fuel		$6,934 18	
3. Oil and waste		318 45	
4. Water for boilers		....	
5. Water power or water rights		....	
6. Wages and salaries		4,589 05	
7. Maintenance, repairs and renewals:			
(*a*) Buildings	$327 24		
(*b*) Steam plant	471 69		
(*c*) Water power plant	....		
(*d*) Electric plant	148 73		
		947 66	
8. General expense		115 65	
9. Current purchased		....	
10. Total production expenses			$12,904 99
Distribution.			
11. Wages and salaries:			
(*a*) Street arc lamps	$415 00		
(*b*) Street incandescent lamps	5 00		
(*c*) General distribution	678 79		
		$1,098 79	
12. Expense beyond meter		....	
13. Supplies, tools and appliances		69 23	
13a. Carbons		191 52	
14. Maintenance, repairs and removals:			
(*a*) Lines overhead	$1,310 90		
(*b*) Lines underground	....		
(*c*) Transformers	....		
(*d*) Meters	441 00		
(*e*) Services	395 38		
(*f*) Commercial arc lamps	422 44		
(*g*) Commercial incandescent lamps	1,700 96		
(*h*) Public (street, etc.) lamps	154 99		
(*i*) Public incandescent lamps	....		
(*j*) Motors, fixtures, appliances rented	....		
		4,425 67	
15. Miscellaneous		....	
16. Total distribution expenses			5,785 21
General.			
17. Directors' allowances		....	
18. Salaries of officers, committee and commissioners		....	
19. General office salaries		$978 00	
20. Rent of offices		....	
21. Office expenses		270 55	
22. Legal expenses		....	

23. Injuries, damages and claims		$6 00	
24. Licenses and royalties		....	
25. Insurance (fire and boiler)		296 50	
26. Bad debts		....	
27. Net loss on sales of meters, engines and other appliances		....	
28. New business:			
(*a*) Advertising and soliciting	....		
(*b*) Appliances and fittings	....		
		....	
29. Other general expenses		....	
30. Total general expenses			$1,551 05
31. Total expenses			$20,241 25

Resume.

Total revenue	$34,271 71
Total expenses	20,241 25
Balance to profit and loss	$14,030 46

O—PROFIT AND LOSS.

(Before dealing with additional items detailed in answers to I 28 and I 43.)

		Allegheny.	Chicago.	Detroit.	South Norwalk.
O 1.	Fiscal year ended	Feb. 28, 1905.	Dec. 31, 1905.	June 30, 1905.	Jan. 1, 1906.
	Credit—				
2.	By balance from last year, if any (surplus Jan. 1, 1906, see answer to O 21)				$23,996 67
3.	By balance of receipts (balance of revenue)				14,030 46
4.	By interest on loans and deposits			$25 68	
5.	By income from sinking fund				
6.	By other items (give particulars, if important)				
7.	By balance (if deficit)	$116,817 82	$372,737 26	$109,871 79	
8.	Total	$116,817 82	$372,737 26	$109,897 47	$38,027 13
	Debit—				
9.	To balance of expenses	$104,931 94	$370,489 26	$109,897 47	
10.	To interest on bonds				$1,700 00
11.	To interest on notes, loans and deposits				1,291 67
12.	To taxes				
13.	To compensation for franchises				
14.	To dividends on stock				
15-18.	To depreciation, sinking, reserve and other funds				
19.	To extensions and new construction	2,006 24			
20.	To other purposes	933 73			
	Removing poles and wires on streets to be improved (E)		2,248 00		
20a.	To fire loss account, amount written off	8,945 91			
21.	To balance, if surplus (Jan. 1, 1906, as under)				*35,035 46
22.	Total	$116,817 82	$372,737 26	$109,897 47	$38,027 13

* Balance as above	$35,035 46
Deduct amount necessary to reduce the book value of the fixed assets to the appraised value at January 1, 1906, as ascertained by the engineers	34,205 27
Surplus January 1, 1906, per adjusted balance sheet, Sec. L, Q. 13	$830 19

Allegheny.

Reconciliation of the expenditure per the books with the expenditure as shown by the commission's schedule, Section O, Question 7, above.

Year Ended February 28, 1905.

		Add to Expenditure.	*Deduct from Expenditure.*
Expenses applicable to prior period, charged in current period in error, now corrected..		....	$2,923 51
Expenses applicable to current period, charged in subsequent period in error, now corrected		$1,835 83	....
Amounts paid from "temporary loan bond issue" properly chargeable to expense account		4,167 91	....
Construction expense charged against operation, in error, now corrected..............		....	225 00
Amount of fire loss account now written off to profit and loss account	$8,945 91		
Less amount credited to operating account on account of tools, supplies, etc., destroyed......	$7,447 63		
		1,498 28	....
		$7,502 02	$3,148 51

Summary.

Expenditure per the books..............................	$112,464 31
Add debit adjustments, as above.........................	7,502 02
	$119,966 33
Less credit adjustments, as above.......................	3,148 51
Net expenditure, per the commission's schedule, Sec. O, Q. 7................................	$116,817 82

Chicago.

Reconciliation of the net expenditure as per the books with the net expenditure as shown by the commission's schedule, Section O, Question 7, above.

Year Ended December 31, 1905.

	Add to Net Expenditure.	*Deduct from Net Expenditure.*
Inventories of coal, carbons and globes, December 31, 1904, not shown on the books as an asset at that date	$7,054 00	
Inventories of coal, carbons and globes, December 31, 1905, not shown on the books as an asset at that date......................	....	$5,592 48
Liabilities for accounts payable December 31, 1904, not shown on the books at that date..	....	12,900 51
Liabilities for accounts payable December 31, 1905, not shown on the books at that date..	14,578 60	....

	Add to Net Expenditure.	*Deduct from Net Expenditure.*
Proportion of salaries of employes of the department of electricity not charged on the books against the bureau of electric lighting	$820 00	....
Proportion of administration salaries and expenses, account properly chargeable to electric light bureau	2,907 57	....
Amounts charged during year to expense account, properly applicable to other bureaus and to prior periods	....	$1,419 21
Amounts charged on books to "extraordinary expense" and "special deposit" accounts, applicable to expense account	18,539 72	....
Amount charged on books to expense account properly chargeable to special deposit account	....	358 61
Amounts received for sale of power during current year applicable to prior period	4,423 68	....
	$48,323 57	$20,270 81

Summary.

Net expenditure, per books	$344,684 50
Add debit adjustments, as above	48,323 57
	$393,008 07
Less credit adjustments, as above	20,270 81
Net expenditure, per Sec. O, Q. 7, of commission's schedule	$372,737 26

Detroit.

Reconciliation of the "balance of expenses" as per the books, with the "balance of expenses" as shown by the commission's schedule, Section O, Question 7, above.

Year Ended June 30, 1905.

		Add to Balance of Expenses.	*Deduct from Balance of Expenses.*
Difference between cash receipts, as per the books, and the revenue applicable to the current period, relating to the following accounts:			
Rentals of track, conduits and poles	$1,904 12		
Incandescent lighting	192 32	....	$1,711 80
Amount due for rental of poles entered on books subsequent to June 30, 1905, applicable to current period		$12 00	....
Balance of inspection department account for current period, now eliminated from the electric light plant accounts		907 80	....
		$919 80	$1,711 80

Summary.

Net expenditure, per the books	$110,633 79
Add debit adjustments, as above	949 80
	$111,583 59
Less credit adjustments, as above	1,711 80
Net expenditure, per the commission's schedule, Sec. O, Q. 7	$109,871 79

South Norwalk.

Reconciliation of the profit as per the books with the profit as shown by the commission's schedule, Section O, Question 3, above.

Year Ended January 1, 1906.

		Deduct from Profit.	Add to Profit.
Consumers' accounts for December, 1905, dealt with as net on which the discounts were subsequently forfeited, as follows:			
Private lighting, metered	$10 43		
Commercial power, metered	9 91	....	$20 34
Expenses applicable to prior period, charged in current period in error, now corrected		....	62 18
Expenses applicable to current period, charged in subsequent period in error, now corrected		$159 62	....
Inventories of supplies not on books:			
January 1, 1905		418 47	....
January 1, 1906		....	363 89
Boiler insurance charged in prior period, applicable to current period		62 50	....
Construction expense charged against operations in error, now corrected		....	25 00
		$640 59	$471 41

Summary.

Profit from operations before dealing with interest, as per the books, year ended January 1, 1906	$14,199 64
Add credit adjustments, as above	471 41
	$14,671 05
Deduct debit adjustments, as above	640 59
Profit from operations before dealing with interest, as adjusted, year ended January 1, 1906, per commission's schedule, Section O, Question 3	$14,030 46

Allegheny.

PROFIT AND LOSS ACCOUNT.

Per Sections M, N and O of the commission's schedule, including entries detailed in answers to I 28 and I 43.

Year Ended February 28, 1905.

Revenue.		*Amount.*		*Per K. W. H. Generated (Output 3,972,959 K. W. H.). (Cents.)*
Income from scrap sold		$852 78		....
Balance, being excess of expenditure		159,786 04		....
		$160,638 82		
Expenses.				
Production—				
Fuel		$28,902 93		73
Oil and waste		2,456 61		06
Water for boilers		3,000 00		08
Wages and salaries		28,511 49		72
Maintenance, repairs and renewals:				
(*a*) Buildings	$1,451 97		04	
(*b*) Steam plant	7,984 90		20	
(*c*) Electric plant	3,437 61		08	
		12,874 48		32
General expense		450 04		01
Total production expenses.		$76,195 55		1 92
Distribution—				
Wages and salaries:				
(*a*) Street arc lamps	$9,440 03		24	
(*b*) General distribution.	1,759 31		04	
		$11,199 34		28
Supplies, tools and appliances		677 63		02
Carbons		6,325 02		16
Maintenance, repairs and renewals:				
(*a*) Lines overhead	$10,424 81		26	
(*b*) Primary line fixtures	261 54		01	
(*c*) Secondary line fixtures	330 25		01	
(*d*) Transformers	875 08		02	
(*e*) Public (street, etc.) lamps	3,391 33		08	
(*f*) Public incandescent lamps	1,974 34		05	
		17,257 35		43
Miscellaneous		1,201 44		03
Total		$36,660 78		92
Deduct fire loss (supplies, tools, etc.).		7,447 63		19
Total distribution		$29,213 15		73

Expenses.		*Amount.*		*Per K. W. H. Generated. (Cents.)*
General—				
General office salaries		$2,678 86	07	
Office expenses		528 65	01	
Insurance (fire and boiler)		972 22	02	
Other general expenses		143 51	01	
Total general expenses		$4,323 24		11
Total expenses, representing cost of operations before dealing with interest and the following additional expenses		$109,731 94		2 76
Add additional expenses:				
Taxes	$9,021 00		$0 22	
Depreciation	30,000 00		76	
Total additional expenses		39,021 00		98
Total cost of operations before charging interest		$148,752 94		3 74
Profit and loss account, per commission's Schedule O, Questions 19, 20 and 20a		11,885 88		....
		$160,638 82		....

Note. In arriving at the above costs we have not included as a part of the cost of operations any charge, either for rent of the plant, interest on bonds, or for interest on the capital invested. The interest on the capital invested, based on the appraised value at February 28, 1905, at 3.927 per cent., being the average of the interest rates paid by the city on all bonds, would amount to .26 cents per K. W. hour, making a total cost of 4 cents per K. W. hour. Calculating the interest on the capital invested represented by the book value of the fixed assets, the cost per K. W. hour would be .52 cents, or a total cost of 4.26 cents per K. W. hour. We are not, however, satisfied as to the accuracy of the amounts shown on the books representing the cost of construction and extensions.

Chicago.

PROFIT AND LOSS ACCOUNT.

Per commission's schedule sections M, N and O, including entries detailed in answers to questions I 28 and I 43.

Fiscal Year Ended December 31, 1905.

Revenue.

As per Section M, Question 16, of commission's schedule	$8,407 98
Rental of building at No. 1 plant used by water department	660 00
Total revenue	$9,067 98
Balance, being excess of expenditure	559,697 02
	$568,765 00

Expenses.

Production—			
Fuel			$102,669 50
Oil and waste			4,211 76
Water for boilers			59,640 00
Wages and salaries			52,075 76
Maintenance, repairs and renewals:			
(*a*) Buildings		$2,102 06	
(*b*) Steam plant		13,892 87	
(*c*) Electric plant		3,268 38	
			19,263 31
General expense			4,053 13
Current purchased			8,874 06
Rented lights			64,881 14
Total production			$315,668 66
Distribution—			
Wages and salaries:			
(*a*) Street arc lamps		$55,228 23	
(*b*) General distribution		1,523 46	
		$56,751 69	
Carbons		18,764 06	
Maintenance, repairs and removals:			
(*a*) Lines overhead (E)	$5,871 91		
(*b*) Lines underground (E)	18,108 24		
(*c*) Public (street, etc.) lamps	18,400 78		
		42,380 93	
Miscellaneous		1,790 48	
Total distribution			$119,687 16
General—			
General office salaries		$4,829 54	
Rent of offices		1,500 00	
Office expenses		249 56	
Legal expenses		500 00	
Injuries, damages and claims		1,032 83	
Insurance (fire and boiler)		4,481 00	
Other general expenses		63 25	
Total general expenses			12,656 18
Cost, before dealing with additional expenses			$448,012 00
Add additional expenses:			
Taxes		$18,505 00	
Depreciation		100,000 00	
Total additional expenses			118,505 00
Total cost of operation, before charging interest			$566,517 00
Profit and loss account, Section O, Question 20.			2,248 00
			$568,765 00

Note. The cost per arc lamp on this basis, excluding the cost for rented lights and current purchased, and after deducting the cost of maintaining the lamps, the current for which is supplied by the Commonwealth Electric Company, is $85.49 per annum.

Taking now the total average number of lamps owned by the city (5,852) as the basis of calculation, and including in the cost of operation the charge for current supplied by the Commonwealth Electric Company through the municipal station, the cost per arc lamp per annum is $85.72.

In arriving at the above costs we have not included as a part of the cost of operation any charge, either for rent of the plant or for interest on the capital invested. The interest on the capital invested, based on the appraised value at December 31, 1905, at 3.96 per cent., being the average of the interest rates paid by the city on all bonds, would amount to $9.11 and $8.94 per arc lamp per annum respectively in the cases above mentioned. Calculating the interest on the capital invested represented by the book value of the fixed assets, the cost per arc lamp per annum would be $13.70 and $13.44 respectively.

We are not, however, satisfied as to the accuracy of the amounts shown on the books representing the cost of construction and extensions.

Detroit.

PROFIT AND LOSS ACCOUNT.

Per sections M, N and O of the commission's schedule, including entries detailed in answers to questions I 28 and I 43.

Fiscal Year Ending June 30, 1905.

Revenue.		*Amount.*		*Per K. W. H. Generated (Output 5,884,541 K. W. H.). (Cents.)*
As per Section M, Question 16, of commission's schedule		$11,553 44		....
Interest, per Section O, Question 4		25 68		....
Rental of privileges for stringing wires		485 40		....
		$12,064 52		....
Balance, being excess of expenditure		182,300 39		....
		$194,364 91		....
Expenses.				
Production—				
Fuel		$30,517 17		0 518
Oil and waste		1,608 50		027
Water for boilers		332 52		005
Wages and salaries		32,435 29		551
Maintenance, repairs and renewals:				
(*a*) Buildings, track and dock	$1,747 07		0 030	
(*b*) Steam plant	4,176 02		071	

Expenses.		*Amount.*		*Per K. W. H. Generated. (Cents.)*
(*c*) Water power plant	....		....	
(*d*) Electric plant ..	$1,211 44		0 021	
		$7,134 53		0 122
General expenses		880 02		015
Total production expenses..		$72,908 03		1 238
Distribution—				
Wages and salaries:				
(*a*) Street arc lamps.	$13,893 69		0 236	
(*b*) Street incandescent lamps	....		....	
(*c*) General distribution	3,199 90		054	
		$17,093 59		0 290
Supplies, tools and appliances......		1,358 65		023
Carbons		7,308 94		124
Maintenance, repairs and removals:				
(*a*) Lines overhead.. (*b*) Lines underground; that is, lines, cables, conduits, towers and lamp-posts	$7,556 21		0 129	
(*c*) Transformers ...	193 79		003	
(*d*) Meters	....		....	
(*e*) Services	412 57		007	
(*f*) Commercial arc lamps	....		....	
(*g*) Commercial incandescent lamps	....		....	
(*h*) Public (street, etc.) lamps....	8,556 66		146	
(*i*) Public incandescent lamps ...	1,434 45		024	
(*j*) Motors, fixtures, appliances rented	....		....	
		18,153 71		309
Miscellaneous		298 65		005
Total distribution expenses.		$44,213 54		0 751
General—				
Salary of secretary		$1,649 92		0 028
General office salaries.............		1,935 15		033
Office expenses		747 54		013
Legal expenses		150 00		003
Injuries, damages and claims......		329 73		006
Licenses and royalties...............		....		....
Insurance (fire and boiler)........		1,933 00		033
Bad debts		....		....
Total general expenses		$6,745 34		0 116

Expenses.		*Amount.*		*Per K. W. H. Generated. (Cents.)*
Total expenses, representing cost of operations before dealing with interest and the following additional expenses		$123,866 91		105
Add additional expenses:				
Taxes	$10,498 00		0 178	
Depreciation	60,000 00		1 020	
Total additional expenses		70,498 00		1 198
Total cost of operation before charging interest		$194,364 91		3 303

South Norwalk.

PROFIT AND LOSS ACCOUNT.

Per sections M, N and O of commmission's schedule, including entries detailed in answers to questions I 28 and I 43.

Year Ended January 1, 1906.

Revenue.		*Amount.*		*Per K. W. H. Generated (Output 734,644 K. W. H.). (Cents.)*
As per Section M, Question 16, of commission's schedule		$34,271 71		4 66
Rent of fire alarm quarters		144 00		02
Rental of privileges for stringing wires		1,000 00		14
Total revenue		$35,415 71		4 82
Expenses.				
Production—				
Fuel		$6,934 18		0 94
Water for boilers		350 00		05
Oil and waste		318 45		04
Wages and salaries		4,589 05		62
Maintenance, repairs and renewals:				
(*a*) Buildings	$327 24		0 04	
(*b*) Steam plant	471 69		06	
(*c*) Electric plant	148 73		03	
		947 66		13
General expenses		115 65		02
Total production expenses		$13,254 99		1 80
Distribution—				
Wages and salaries:				
Street arc lamps	$415 00		0 06	
Street incandescent lamps	5 00		....	
General distribution	678 79		09	
		$1,098 79		0 15
Supplies, tools and appliances		69 23		01
Carbons		191 52		03

Expenses.		*Amount.*		*Per K. W. H. Generated. (Cents.)*
Maintenance, repairs and removals:				
(*a*) Lines overhead.	$1,310 90		0 18	
(*b*) Meters	441 00		06	
(*c*) Services	395 38		05	
(*d*) Commercial arc lamps	422 44		06	
(*e*) Commercial incandescent lamps	1,700 96		23	
(*f*) Public (street, etc.) lamps....	154 99		02	
		4,425 67		0 60
Total distribution expenses....		$5,785 21		0 79
General—				
General office salaries...	$978 00		0 13	
Office expenses	400 55		05	
Injuries, damages and claims	6 00		..	
Insurance, fire and boiler.	296 50		05	
Total general expenses........		$1,681 05		0 23
Cost before dealing with additional expenses		$20,721 25		2 82
Add additional expenses:				
Taxes	$968 50		0 13	
Depreciation	7,000 00		95	
Total additional expenses......		7,968 50		1 08
Total cost of operation........		$28,689 75		3 90
Profit from operations before charging interest............		6,725 96		92
		$35,415 71		4 82

Reconciliation of surplus account as per the books with the surplus account as per the commission's schedule, Section L, Question 13, and Section O, Question 21, as at January 1, 1906.

		Deduct from Surplus.	*Add to Surplus.*
Amount necessary to reduce the book value of the fixed assets to the appraised value as ascertained by the engineers:			
Book value...............	$116,944 90		
Appraised value...........	82,739 63		
Difference		$34,205 27	
Invoices entered on the books subsequent to January 1, 1906, applicable to period prior to that date		159 62	
Interest accrued January 1, 1906, entered upon books subsequent thereto		500 00	

	Deduct from Surplus.	Add to Surplus.
Interest paid in advance January 1, 1906, entered in the books prior thereto	......	$313 00
Construction expense charged against operations, in error	......	25 00
Fire and boiler insurance unexpired January 1, 1906, not dealt with on the books as an asset.	......	120 00
Discounts to consumers entered on the books in 1905, forfeited as at January 1, 1906	......	20 34
	$34,864 89	$478 34

Summary.

Surplus as per the books January 1, 1906	$35,216 74
Add credit adjustments as above	478 34
	$35,695 08
Deduct debit adjustments as above	34,864 89
Surplus as adjusted January 1, 1906, per the commission's schedule Sec. L, Q. 13, and Sec. O, Q. 21	$830 19

Detroit.

Copy of Agreement between the Public Lighting Commission and the Wayne County Board of Auditors.

Memorandum of agreement made this 21st day of June, A. D. 1901, between the Public Lighting commission of the city of Detroit, Michigan, party of the first part, and the Board of Auditors of Wayne county, Michigan, party of the second part;

Witnesseth: The said party of the first part agrees to furnish electric current and lamp renewals beginning July 1, 1901, up to January 1, 1903, to the county building and county jail, for three and three-quarter cents per kilowatt hour, and to do all the necessary wiring in the streets to accomplish this end, and render bills monthly for all current used.

The said second party agrees to equip the said buildings for this purpose, and supply the original set of lamps deemed necessary by them to properly light said buildings, and pay monthly for current furnished.

In witness whereof, the said parties have hereunto set their hands the day and year above written.

PUBLIC LIGHTING COMMISSION,
By David W. Simons, President.
Frank F. Bowler, Secretary.

WAYNE COUNTY BOARD OF AUDITORS,
By Hugh J. Scullen, President.
Theo. H. Christian, Secretary.

Copy of Agreement between the Public Lighting Commission and the Detroit Boat Club.

Detroit, April 22, 1899.

It is hereby agreed by and between the Public Lighting commission of the city of Detroit and the Detroit Boat club, also of Detroit, as follows:

The Detroit Boat club shall at their own expense lay the necessary conduits and cables to connect the public lighting mains on Belle Isle park with the Detroit Boat club house, also on Belle Isle park, the work to be done under the rules of the park and boulevard commission, and under the supervision of the city electrician.

That such conduits and cables shall become the property of the Public Lighting commission at any time on the payment of the cost less a discount at the rate of fifteen per cent. p. a. for the time used.

That the Public Lighting commission shall supply the Detroit Boat club house with electric current for incandescent lighting as long as said commission supplies current for the lighting of public buildings on the Belle Isle park.

That the Detroit Boat club shall pay to the Public Lighting commission in monthly installments for the electric current used at the rate of not to exceed six cents per kilowatt hour while the conduits and cables are the property of the Detroit Boat club, and at the rate of not to exceed eight cents per kilowatt hour when the conduits and cables are owned by the Public Lighting commission.

That the cost of repairs to the conduits and cables and of lamp renewals be borne by the Public Ligthing commission, and the cost of repairs to the club house wiring shall be borne by the Detroit Boat club.

Subscribed to in duplicate by the Public Lighting commission and the Detroit Boat club by their respective executive officers the day and year first above written.

PUBLIC LIGHTING COMMISSION,
By A. H. Ritter, President,
Fred Starring, Secretary.

DETROIT BOAT CLUB,
By Harry L. Pierson, President.
George B. Sheehy, Secretary.

Copy of Agreement between the Public Lighting Commission and the Detroit Yacht Club.

It is agreed by and between the Public Lighting commission and the Detroit Yacht club, both of the city of Detroit, Michigan, as follows:

The Public Lighting commission hereby agrees to furnish incandescent lighting to the club house of the Detroit Yacht club on Belle Isle park.

The Detroit Yacht club hereby agrees to pay to the Public Lighting commission for such electric lighting furnished the sum of eight (8) cents for each kilowatt hour of current furnished; bills to be rendered monthly to the Detroit Yacht club by the Public lighting commission.

This agreement is to remain in force until terminated, and may be terminated at any time by either party to same by written notice.

Dated at Detroit this 25th day of May, 1900.

THE PUBLIC LIGHTING COMMISSION,
By F. F. Ingram, President.
H. S. Guerin, Secretary.

THE DETROIT YACHT CLUB,
By Wm. D. C. Moebs, Commodore.
J. K. Moore, Secretary.

List of rates for contacts on poles, use of track and conduits.
Rates for contacts on poles; (given or received).

Contacts.	
To No. 0 inclusive	10c. per pin
From No. 00 to No. 000 inclusive	15c. per pin
Cross Arms.	
1 10 pin cross arm or less	40c.
3 to 4 10 pin cross arms	30c. per cross arm
5 or more 10 pin cross arms	20c. per cross arm
Rentals.	
Use of track:	
Per car	50c.
Use of conduits:	
Edison Illuminating company—	
January 1 to December 31, 1904	$856 79
January 1 to December 31, 1905	$488 71
Cooperative Telephone company—	
January 1 to December 31, 1904	$405 80
January 1 to December 31, 1905	$610 41

REPORT ON THE FINANCIAL AFFAIRS OF THE MUNICIPAL ELECTRIC LIGHT PLANT, CHICAGO, ILL.—1887 TO 1905, BY MARWICK, MITCHELL & CO.

New York, April 30, 1907.

Professor Frank J. Goodnow, Chairman,
Sub-committee of Commission on Municipal Ownership and Operation,
281 Fourth Avenue, New York.

Dear Sir—In accordance with your instructions we have made an investigation into the financial affairs of the electric light plant of the city of Chicago, for the period from the year 1887 to December 31, 1905, with the object of determining the capital expenditure and cost of operations, and a comparison between the cost of operations and the cost to the city had the lamps been rented.

We now submit our report thereon, together with the following exhibits:

Exhibit "A," balance sheet as at December 31, 1905.

Exhibit "B," cost of land, construction and equipment of the plants, and extension of the system from the year 1887 to December 31, 1905.

Exhibit "C," revenue and expenditures from the year 1888 to December 31, 1905, including estimated charges not dealt with on the books.

Exhibit "D," expenditures on account of rented lights and current purchased from the year 1889 to December 31, 1905.

Exhibit "E," comparative statement showing the cost of operation from the year 1888 to December 31, 1905, and the probable cost to the city had the arc lamps been rented.

Exhibit "F," simple interest at 4 per cent. per annum on cost of construction, operations less depreciation and probable cost if rented, from 1888 to December 31, 1905.

Exhibit "G," compound interest at 4 per cent. per annum on cost of construction, operations less depreciation, and probable cost if rented, from the year 1888 to December 31, 1905.

Exhibit "H," comparative statement showing cost of construction, operations, and probable cost if rented, including simple and compound interest, from the year 1888 to December 31, 1905.

Exhibit "I," estimated consumption of city water in plants, years 1888 to 1904 inclusive.

Balance Sheet.

The following is a condensed general balance sheet of the Municipal Electric Lighting Bureau of the city as at December 31, 1905, based on an appraisal of the plant made by the Engineers, Messrs. Stebbins and Phelps:

Assets.	
Fixed:	
Land	$49,501.84
Construction and equipment of plants and extension of system	1,266,205.34
Current:	
Sundry accounts due	5,740.00
Funds held by city against "special deposits" unexpended	34,319.74
Operating stocks on hand	6,292.48
Total assets	$1,362,059.40
Liabilities.	
Current:	
Unpaid bills	$32,494.45
Special deposits for extension of system	34,319.74
Surplus	1,295,245.21
Total Liabilities	$1,362,059.40

Cost of Land, Construction of Plants and Extension of System.

We submit in Exhibit "B" a summary of the expenditures on account of the construction and equipment of the plants and extension of the system from 1887, the year in which municipal electric lighting was first introduced in the city of Chicago, to December 31, 1905. To the amount expended as shown by the records of the city we have added the sum of $1,000 per annum from 1888 to 1904, inclusive, as an estimated proportionate charge for superintendence of construction and salaries entered on payrolls other than those of the Electric Light Department.

In the latter part of the pear 1892 the plant located at Throop street was sold to the Metropolitan Elevated Railroad Company for $100,000, together with seven lots valued at $30,000. The plant, however, was occupied and operated by the department free of rental until the year 1896.

We have deducted the sum of $103,890.28 from the cost of construction, representing the value of the Throop street plant sold.

In 1899 the electric lighting equipment of the West Park Board was transferred to the department, although we understand no legal transfer was made or payment made therefor. The equipment consisted of 203 lamps and the necessary circuits, conduits and posts. After consultation with the city electrician we put an estimated value of $50,000 on the equipment, which amount we have charged to the cost of construction of the plants.

The capital expenditure may be briefly summarized as follows:

Cost of construction and equipment of the plants and extension of the system.		$2,288,665.77
Land		79,340.74
Total capital expenditure		2,368,006.51
From which deduct:		
Estimated value of Throop street plant and land sold in 1892	$103,890.28	
Depreciation (being amount necessary to reduce the book value of the plant to the appraised value stated by the engineers)	941,610.65	
Depreciation in value of land	6,798.40	
		1,052,299.33
Appraised value as at December 31, 1905		$1,315,707.18

The difference between the book value of the plant, exclusive of land, and the appraised value as ascertained by the engineers, Messrs. Stebbins and Phelps, after allowing for the value of the Throop street plant which was sold in 1892, is $941,610.65, and this amount we have charged to the operations of the plant as depreciation. This charge for depreciation amounts to 7.39 per cent. per annum of the cost of construction, exclusive of land, calculated on the reducing annual values. The amount included as depreciation and charged to the operations of the plant in 1905, viz., $100,000, is the estimated depreciation for that year as stated by the engineers.

In that year we have charged the sum of $6,798.40 to profit and loss account, being the amount necessary to reduce the book value of the land to the appraised value as ascertained by the engineers. We have not, however, considered the depreciation in the value of land, as a charge against the operations of the plant.

During the years 1902, 1903, 1904 and 1905 the cost of construction of underground work was charged to the Electric Light Department on the books, although a proportion of this is properly applicable to the Police and Fire Alarm Telegraph Bureau, the conduits being utilized for the wires of that bureau, as well as for those of the Electric Light Department. We have, however, accepted the estimates prepared by the department as to the amount properly chargeable to the Police and Fire Alarm Telegraph Bureau, which we have deducted from the cost of construction.

Cost of Operations.

We submit in Exhibit "C" a detailed statement of the cost of operations from the year 1888 to December 31, 1905, including depreciation and other estimated charges not dealt with on the books of the city. The following is a summary of the cost of operations, the average number of lamps operated and the cost per arc lamp per annum:

			Cost per Arc Lamp Per Annum.	
Year.	*Cost of Operations (Exclusive of Interest).*	*Average Number of Arc Lamps.*	*Exclusive of Interest.*	*Including Compound Interest at 4 Per Cent. Per Annum on Capital Invested.*
1888	$16,732 29	192	$87 15	$101 83
1889	59,304 61	297	199 68	238 33
1890	116,824 79	900	129 61	155 19
1891	173,434 33	993	174 76	207 28
1892	176,365 24	1,102	160 04	192 17
1893	183,081 00	1,112	164 64	196 97
1894	175,589 10	1,108	158 47	194 06
1895	185,772 52	1,116	166 46	205 86
1896	188,441 07	1,254	150 27	188 39
1897	174,559 91	1,438	121 39	156 99
1898	187,393 73	1,710	109 60	142 76
1899	246,051 06	2,893	85 32	109 01
1900	355,629 32	3,867	91 96	112 53
1901	366,763 85	4,305	85 19	101 24
1902	362,177 93	4,508	80 34	99 28
1903	379,289 15	4,827	78 57	98 78
1904	390,111 41	5,034	77 50	106 45
1905	491,006 32	5,743	85 49	100 06
Total cost of Operations,	$4,228,555 86	42,399	$99 73	$124 32

It will be noticed from the above figures that the average cost per arc lamp per annum, based on the total cost of operations throughout the period, and excluding the cost of rented lights and current purchased, is $99.73, exclusive of interest. Including compound interest on the capital invested in construction and equipment of the plants and extension of the system the average cost is $124.32 per arc lamp. The respective costs in the year 1905 were $85.49 and $100.06.

No allowance has been made for the inventory values of stock on hand at the close of each year, except in 1904 and 1905, when the amounts were known.

In order to determine the true results of the operations of the plant, it was necessary to include in the above figures certain items not dealt with on the books. We will now briefly describe the method adopted in arriving at these estimates.

Taxes. The estimated figure for taxes in each year is based on a one-fifth valuation of the real and personal property at the average of the rates levied during each year in the several districts of the city, for State, county and city purposes.

Depreciation. As already mentioned, we calculated the depreciation at 7.39 per cent. per annum on the cost of construction and extensions, excluding land, this being the rate necessary to reduce the book value to the appraised value as stated by the engineers.

Insurance. We have not included in the accounts any charge for accident insurance, this being considered a prohibited risk.

The amounts included for fire and boiler insurance in 1905 are based at 1 per cent. and 1¼ per cent. respectively on the appraised values, the rates being obtained from insurance companies. In the other years, owing to the values of the buildings and machinery not being obtainable, we based our estimates on the 1905 figure, and on what appeared to us to be a consistent and reasonable charge under this head.

Water. The water consumption in 1905 was estimated by the engineers, Messrs. Stebbins and Phelps, at not less than 1,400,000,000 gallons for both feed and condensing purposes, which, at city water rates, amounts to $59,640.

The estimated water consumption and the cost of same for the years from 1888 to 1904 inclusive is shown on Exhibit "I." These estimates of consumption have been based on information supplied by Mr. Wm. Carroll, city electrician, showing the results (1) of a pitometer test made at the Halsted street station in November, 1906, by Mr. John Ericson, city engineer, and (2) of a test of the engines located in the three stations using city water, made about the same time by Mr. Martin C. Schwab, consulting electrical engineer.

While we have included the above charges at regular city water rates, the following table shows the comparison between these charges and the charges when based on the actual cost (exclusive of interest) in 1905 to the water department:

Year.	*At City Water Rates.*	*Based on Cost in 1905 to the Water Dept.*
1888	$223.92	$51.47
1889	324.72	79.62
1890	903.60	241.27
1891	992.88	255.20
1892	1,097.52	295.42
1893	1,107.12	298.10
1894	890.16	237.52
1895	906.88	239.40
1896	4,791.28	1,326.91
1897	5,167.44	1,462.47
1898	8,398.48	2,628.26
1899	13,198.16	5,561.86
1900	17,950.64	7,434.22
1901	22,929.20	10,773.24
1902	23,838.00	11,280.81
1903	25,265.20	12,077.90
1904	26,193.20	12,596.19
1905	59,640.00	31,276.00
	$213,818.40	$98,115.86

Rental of Lands and Buildings. Since the year 1894, the department has paid a ground rent of $2,500 per annum for ground situated at South Halsted street, and used as a store yard. As the yard is also used in connection with the Police and Fire Alarm Telegraph Bureau, we have only charged 50 per cent. of the annual rent against the operations of the Electric Light Bureau. We have also included in the accounts the estimated ground rentals of land belonging to the city, but not to the Electric Light Bureau, occupied by plants at Indiana avenue, Chicago avenue and Fullerton avenue. These estimates we have taken at 4 per cent. on the values as appraised by the city real estate expert. During the years 1888 to 1891, we have charged $1,000 per annum as rental of the buildings then occupied by the department, while from 1892 to 1896 we have included the sum of $10,389 per annum as estimated rental of the Throop street plant, sold to the Metropolitan Elevated Railroad Company in 1892, but occupied by the department free of charge until 1896. We have assumed in this case 10 per cent. of the capital invested as a fair annual rental. We have also allowed the department credit for estimated rental of building at Indiana avenue used by the Water Works Department as a repair shop during 1905 at the rate of 4 per cent. per annum on the estimated value, viz., $660.

Rent of Premises in City Hall. From 1888 to 1897 inclusive, we have made an estimated charge of $500 per annum for rent of premises in the City Hall, which we have increased in 1898 to $1,000, and in 1901 to $1,500 per annum.

Proportion of Salaries of Other City Departments Properly Chargeable Against the Electric Light Bureau. We have made an estimated charge of $2,000 per annum for office and other salaries not charged to the department from the year 1888 to 1897 inclusive. From 1898, the year in which the Department of Electricity was formed, to 1900, we have charged $2,500 in addition to 25 per cent. of the salaries of the superintendent, chief clerk and bookkeeper. From the year 1901 we have increased the estimate to $3,500. These estimates are intended to cover the proportion of salaries paid to the city treasurer, comptroller, auditor and staffs properly applicable to the Electric Light Bureau. As a proportion of the salaries and expenses of the Law Department of the city, we have charged the sum of $500 per annum.

Privilege of Stringing Wires on Poles of Private Companies. The Electric Light Department has the privilege of stringing its wires on the poles of the following companies, for which no charge is made:

Chicago Telephone Company.
Postal Telegraph Company.
Western Union Telegraph Company.
Commonwealth Electric Company.
Chicago City Railway.
Chicago Union Traction Company.

This privilege, however, is offset by the corresponding privilege these companies have of stringing their wires on city poles. We have been unable to obtain any figures as to the relative values of these privileges.

Steam Heat Supply. During the years 1903, 1904 and 1905 the department supplied steam heat to the Police and Fire Alarm Office at Wentworth avenue. It is estimated by the management that the increased consumption of coal on this account would approximate $2,500 per annum. We have accordingly credited the value of this service to the fuel account in these years.

Work Done by Other Departments. In analyzing the expenses we have found several payments made to the Department of Public Works on account of work performed by them. We do not believe that in every instance a charge was made, more especially in the early years. The superintendent of the bureau informs us, however, that any such charge would be very small and would be practically offset by a corresponding credit to the operating account on account of work performed by his men for that department.

Outages. We are informed by the superintendent that formerly no attempt was made to keep proper records of outages, although the bureau now keeps such records. He states that outages are not frequent and that it may be assumed that over the entire period the outages have been normal for a plant of this description operating series arc lamps.

Rented Lights and Current Purchased.

We submit in Exhibit "D" details of the amount expended from 1890 to December 31, 1905, on rented lights and current purchased, the average number of lamps rented, and the average cost per lamp per annum. In arriving at the cost per lamp per annum we excluded the amount expended on lamps jointly rented and the amount expended on current purchased. The following is a brief summary of the number of lamps rented outright and the average cost per lamp:

Year.	*Average Number of Lamps.*	*Average Cost per Lamp per Annum.*
1890	93	$177.95
1891	166	174.33
1892	174	174.63
1893	184	155.62
1894	203	137.38
1895	524	103.38
1896	480	113.28
1897	492	113.23
1898	515	109.10
1899	529	103.28
1900	665	102.84
1901	671	101.58
1902	600	102.66
1903	611	102.82
1904	656	102.92
1905	643	102.52

It will be observed that the average cost per rented lamp varied from $177.95 per annum in the year 1890 to $102.52 per annum in 1905. It will also be noticed that the average cost in 1895 is somewhat lower than in succeeding years. This is due to the fact that towards the close of that year considerable competition was evidenced and finally contracts were entered into with the Hyde Park Electric Light and Power Company for rented lamps at $84 per annum and with the Mutual Electric Light and Power Company at $82 per annum, while the Chicago Edison and the People's Light and Power Company were charging $137.50. The average cost per rented lamp in 1905 was $102.52.

Comparison Between Cost of Operations and Cost to the City Had the Lamps Been Rented.

In Exhibit "E" we submit details of the cost of operations and a comparison with the probable cost to the city had the same number of lamps been rented. In examining this statement it should be noticed that the cost of operations includes all estimated charges such as a private corporation would have to pay, e. g., taxes, water, insurance, etc., while the cost to the city, had the lamps been rented, is based on the average cost of rented lights in the past and not on the rates charged by any one private corporation. In arriving at the figures in the column headed "Probable cost if rented," we applied the average cost of lamps rented outright on the average number of lamps operated by the city regardless of whether operated on overhead or underground circuits. Our information regarding the number of lamps rented and cost per lamp rented was obtained from the vouchers. In some cases the information there given was very meagre and no indication was given as to whether the rented lamps were operated on overhead or underground circuits. We consequently did not feel justified in attempting to make the distinction, as the prices varied to such an extent and as in former years overhead lamps were rented for more than those operated on underground circuits, while to-day the reverse is the case.

We have also submitted an estimate made by the bureau of the probable cost of renting lamps, taken from the annual report of the bureau. This estimate is based on the assumption that the private companies would charge $137.50 per annum for lamps on underground circuits, while they only charged $103 for those operated on overhead circuits. This rate of $137.50 was charged by them during 1898, the last year in which they were called upon to light lamps on underground circuits. In the later years one-third of the lamps operated by the city were on underground circuits.

The following is a brief summary of the results shown in Exhibit "E":

Total cost of operations, exclusive of interest, from 1888 to December 31, 1905..................	$4,228,555.86
Total probable cost to the city had the arc lamps been rented, from 1888 to December 31, 1905 (based on the average cost per lamp paid in the past for rented lights, irrespective of whether operated on overhead or underground circuits).	$4,744,550.20
Total probable cost to the city had the arc lamps been rented, from 1888 to December 31, 1905 (based on estimate made by the Department of Electricity, assuming $137.50 as the rate charged by the companies since 1898 for lamps operated on underground circuits)..................	$5,332,113.00

The foregoing figures under this head do not include interest on the capital invested for the construction of plant and equipment, or on expenditures for operations and assumed expenditures for rental. The current rate of interest on the principal bonds of the city of Chicago is 4 per cent. per annum. Assuming that rate for the present purposes and applying it to the cost of construction as well as to the cost of operations and the "Probable Cost if Rented," the following is the result:

	Amount with Simple Interest.	*Amount with Compound Interest.*
Cost of construction, as per Exhibit "B"..................	$2,264,116.23	$2,264,116.23
Cost of operations as per Exhibit "C"	4,228,555.86	4,228,555.86
	$6,492,672.09	$6,492,672.09

Less:		
Depreciation of plants, included in cost of operations, as per Exhibit "B"............	941,610.65	941,610.65
	$5,551,061.44	$5,551,061.44
Interest on cost of construction and operations less depreciation, as per Exhibits "F" and "G"................	1,635,480.37	2,034,008.52
	$7,186,541.81	$7,585,069.96
Less appraised value of plant, December 31, 1905............	1,315,707.18	1,315,707.18
Total..............	$5,870,834.63	$6,269,362.78
Probable cost if rented, as per Exhibit "E"..................	$4,744,550.20	$4,744,550.20
Interest thereon, as per Exhibits "F" and "G"...............	1,133,299.18	1,359,890.62
Total...............	$5,877,849.38	$6,104,440.82
Probable cost if rented, estimated by the department, as per Exhibit "E"..................	$5,332,113.00	$5,332,113.00
Interest thereon, as per Exhibits "F" and "G"...............	1,249,155.45	1,491,041.73
Total...............	$6,581,268.45	$6,823,154.73

Using simple interest and comparing the net cost to the city, $5,870,834.63, as above, with the probable cost if rented, $5,877,849.28, which figure has been determined as already explained, the estimated gain to the city is $7,014.75. Further, a comparison of the cost to the city with the probable cost if rented as estimated by the department as above, shows an estimated saving to the city of $710,433.82.

Using compound interest and comparing the net cost to the city, $6,269,362.78, as above, with the probable cost if rented, $6,104,440.82, the estimated loss to the city is $164,921.96. A comparison of the cost to the city with the probable cost if rented as estimated by the department as above shows an estimated saving to the city of $553,791.95.

Of course, it is impossible to say whether the companies would have conceded lower rates had the city entered into contracts for the entire lighting of the city, or whether in view of the withdrawal of competition by the city, higher rates might have been demanded.

General.

In the early years of the plant no distinction was made on the books throughout the year between the expenditure on account of construction and operation of the plant. We consequently experienced great difficulty in arriving at a correct distribution. The figures submitted, however, may be taken as substantially correct.

Prior to the year 1898 the Electric Light Bureau was embraced by the Department of Public Works and expenditures on its account were charged to various funds, such as Fire Department, Police, Street Lamp and Department of Public Works. This also tended to increase the difficulty of obtaining accurate information as to the total expenditures during these years.

In 1898, however, in accordance with a Council order passed on January 24 of that year, a Department of Electricity was established and thereafter distinction was made on the books between construction and operating expenses.

Yours truly,

Marwick, Mitchell & Co., C. A.

EXHIBIT "A."

City of Chicago, Electric Light Bureau.

Balance Sheet as at December 31, 1905.

Assets.			
Office Furniture		$500 00	
Land		49,501 84	
Buildings		88,793 98	
Steam Plant		213,740 77	
Electric Plant		69,687 45	
Lines:			
Overhead	$148,425 25		
Underground	613,913 86		
		762,339 11	
Lamps		95,358 75	
Teams, tools and other accessories		3,150 00	
Construction material on hand		32,635 28	
Total Fixed Assets			*$1,315,707 18
Stock on hand:			
Fuel	$231 33		
Carbons	4,911 15		
Globes	450 00		
Miscellaneous operating supplies	700 00		
		6,292 48	
Funds held by City against "Special Deposits" unexpended		34,319 74	
Sundry Accounts due		5,740 00	
Total Current Assets			46,352 22
			$1,362,059 40
Liabilities.			
Unpaid Bills		$32,494 45	
Special Deposits:			
(1) For extension of electric light system.	$25,317 10		
(2) For extending and maintaining Electric Arc Lamps along Right of Way of Chicago City Railway Company	9,002 64		
		34,319 74	
Total Current Liabilities			$66,814 19
Surplus			1,295,245 21
			$1,362,059 40

---

* Based on Appraisal made by Engineers Stebbins & Phelps.

EXHIBIT
REVENUE AND
(Including amounts not
From the Year 1888

	1888.	1889.	1890.	
Revenue				
Sundry Consumers	....	....	....	1
Miscellaneous Receipts	....	....	....	2
Total Revenue	....	....	....	3
Expenses				
Production.				
Fuel	$3,507 81	$8,926 73	$18,667 05	4
Oil and Waste	469 26	948 41	1,111 29	5
Water	223 92	324 72	903 60	6
Wages and Salaries	3,659 22	13,283 48	27,874 34	7
Maintenance, Repairs and Renewals:				
a Building	....	283 41	890 25	8
b Steam Plant	682 08	2,065 20	2,280 07	9
c Electric Plant	3 62	595 05	5,128 04	10
General Expenses (Including Rental of Plant and Ground)	1,084 25	1,457 04	2,601 21	11
Total Production	$9,630 16	$27,884 07	$59,455 85	12
Distribution:				
Wages and Salaries:				
a Street Arc Lamps	$32 81	$5,445 79	$8,095 80	13
b General Distribution	....	31 50	726 00	14
Supplies, Tools and Appliances	256 81	323 96	697 49	15
Carbons	632 00	3,089 43	4,557 13	16
Maintenance, Repairs and Renewals:				
a Lines Overhead and Underground	524 85	1,172 77	557 36	17
b Public, Street, etc., Lamps	787 72	2,074 83	1,481 94	18
Miscellaneous (Including Rent of Ground)	34 70	696 26	194 74	19
Total Distribution	$2,268 89	$12,834 54	$16,310 46	20
General:				
Office Salaries	$2,000 00	$2,000 00	$2,000 00	21
Office Expenses	....	50 05	201 84	22
Injuries, Damages and Claims	....	....	3 50	23
Legal Expense, E	500 00	500 00	500 00	24
Office Rent, E	500 00	500 00	500 00	25
Other General Expenses	....	348 42	173 20	26
Add				
Taxes, E	1,521 63	4,793 38	8,320 53	27
Insurance, E	170 00	280 00	860 00	28
Depreciation, E	141 61	10,114 15	28,499 41	29
Total General	$4,833 21	$18,586 00	$41,058 48	30
Total Expenses	$16,732 29	$59,304 61	$116,824 79	31
Deduct Power Sold	....	....	....	32
Total Cost of Operations before dealing with Interest	$16,732 29	$59,304 61	$116,824 79	33
Average Number of Arc Lamps	192	297	900	34
Cost per Arc Lamp (Exclusive of Interest)	$87 15	$199 68	$129 81	35
Balance being excess of Expenses over Revenue	$16,732 29	$59,304 61	$116,824 79	36
Profit and Loss Account				
Debits				
Depreciation of Land	....	....	....	37
Current Purchased	....	....	....	38
Rented Lights	....	$190 00	$18,610 89	39
Other Purposes	....	....	352 50	40
Total Debits	....	$190 00	$18,963 39	41
Total	$16,732 29	$59,494 61	$135,788 18	42
From which Deduct				
Profit on Sale of Plant at Throop Street	....	....	....	43
Balance being Net Expenditure	$16,732 29	$59,494 61	$135,788 18	44

"C."

EXPENDITURES
dealt with on the books)
to December 31, 1905.

	1891.	1892.	1893.	1894.	1895.	1896.	1897.
1	....	....	....	....	....	....	....
2	$1,158 33	....	$822 97	....	....	$835 83	$66 80
3	$1,158 33	....	$822 97	....	....	$835 83	$66 80
4	$33,694 26	$30,378 85	$28,471 63	$33,416 08	$30,681 19	$26,267 35	$29,064 32
5	1,941 86	1,756 39	1,421 75	1,791 91	2,087 38	1,949 93	1,619 82
6	992 88	1,097 52	1,107 12	890 16	906 88	4,791 28	5,167 44
7	39,136 09	40,506 42	37,235 55	33,950 91	41,693 78	40,624 22	34,088 59
8	653 91	867 17	405 54	1,902 89	162 82	519 44	615 28
9	6,913 23	4,383 41	2,574 75	4,611 36	3,889 11	4,196 18	4,007 88
10	3,114 40	3,417 49	2,791 29	1,920 95	1,279 98	2,776 32	4,792 07
11	3,251 42	1,872 14	11,926 92	11,749 74	11,686 94	12,090 24	1,945 46
12	$89,698 05	$84,279 39	$85,934 55	$90,234 00	$92,388 08	$93,214 96	$81,300 86
13	$12,608 00	$12,636 76	$13,313 21	$13,382 43	$13,845 96	$15,588 59	$13,918 15
14	3,451 00	4,968 21	5,475 15	6,754 37	2,546 54	1,793 00	2,590 21
15	178 38	....	1,312 36	605 46	658 55	568 85	860 52
16	6,018 75	4,804 30	10,715 60	1,732 80	5,204 14	11,112 54	1,081 25
17	246 40	182 22	2,751 25	456 79	3,733 26	1,023 55	4,743 58
18	705 88	1,210 05	2,962 11	2,805 29	3,929 57	822 60	5,204 61
19	440 27	170 40	1,274 65	514 19	1,227 28	1,524 27	2,096 28
20	$23,648 68	$23,971 94	$37,804 33	$26,251 33	$31,145 30	$32,433 40	$30,494 60
21	$2,000 00	$2,000 00	$2,000 00	$2,000 00	$2,000 00	$2,000 00	$2,000 00
22	267 98	151 20	115 18	140 20	78 52	271 58	150 57
23	....	....	49 50	....	....	114 15	9 35
24	500 00	500 00	500 00	500 00	500 00	500 00	500 00
25	500 00	500 00	500 00	500 00	500 00	500 00	500 00
26	398 80	301 09	192 77	48 21	246 08	....	192 99
27	9,143 80	9,045 99	8,162 54	8,943 15	11,664 15	10,377 63	11,335 26
28	1,700 00	1,700 00	1,130 00	2,120 00	2,120 00	2,120 00	2,120 00
29	45,577 02	53,915 63	46,692 13	44,852 21	45,130 39	46,909 35	45,957 28
30	$60,087 60	$68,113 91	$59,342 12	$59,103 77	$62,239 14	$62,792 71	$62,765 45
31	$173,431 33	$176,365 24	$183,081 00	$175,589 10	$185,772 52	$188,441 07	$174,560 91
32	....	....	....	....	....	....	....
33	$173,434 33	$176,365 24	$183,081 00	$175,589 10	$185,772 52	$188,441 07	$174,560 91
34	993	1,102	1,112	1,108	1,116	1,254	1,438
35	$174 76	$160 04	$164 64	$158 47	$166 46	$150 27	$121 39
36	$172,276 00	$176,365 24	$182,258 03	$175,589 10	$185,772 52	$187,605 24	$174,494 11
37	....	....	....	....	....	....	....
38	....	....	....	....	....	....	....
39	$30,138 88	$31,585 24	$29,370 68	$28,513 16	$55,234 48	$55,015 89	$56,302 47
40	....	111 00	....	1,657 06	622 51	303 15	9 00
41	$30,138 88	$31,696 24	$29,370 68	$30,170 22	$55,856 99	$55,319 04	$56,311 47
42	$202,414 88	$208,061 48	$211,628 71	$205,759 32	$241,629 51	$242,924 28	$230,805 58
43	....	26,109 72	....	....	....	....	....
44	$202,414 88	$181,951 76	$211.628 71	$205,759 32	$241,629 61	$242,924 28	$230,805 58

	1898.	1899.	
Revenue:			
Sundry Consumers	....	....	1
Miscellaneous Receipts	$96 00	....	2
Total Revenue	$96 00	....	3
Expenses:			
Production:			
Fuel	$30,618 44	$43,421 57	4
Oil and Waste	1,904 57	2,457 95	5
Water	8,398 48	13,198 16	6
Wages and Salaries	25,290 68	29,046 46	7
Maintenance, Repairs and Renewals:			
a Buildings	284 29	692 64	8
b Steam Plant	7,853 78	7,035 00	9
c Electric Plant	926 84	4,135 50	10
General Expenses (Including Rental of Plant and Ground)	2,130 37	1,675 27	11
Total Production	$77,407 45	$101,662 55	12
Distribution:			
Wages and Salaries:			
a Street Arc Lamps	$17,162 53	$28,849 99	13
b General Distribution	2,571 39	2,690 52	14
Supplies, Tools and Appliances	192 52	842 62	15
Carbons	4,646 96	9,853 48	16
Maintenance, Repairs and Renewals:			
a Lines Overhead and Underground	9,707 95	14,925 39	17
b Public, Street, etc., Lamps	6,743 39	9,032 92	18
Miscellaneous (Including Rent of Ground)	1,584 06	1,386 90	19
Total Distribution	$42,608 80	$67,608 82	20
General:			
Office Salaries	$3,503 80	$3,598 15	21
Office Expenses	252 15	199 98	22
Injuries, Damages and Claims	30 00	47 60	23
Legal Expense, E.	500 00	600 00	24
Office Rent, E.	1,000 00	1,000 00	25
Other General Expenses	488 59	364 27	26
Add:			
Taxes, E.	13,466 15	11,734 44	27
Insurance, E.	2,630 00	3,560 00	28
Depreciation, E.	45,506 79	55,775 25	29
Total General	$67,377 48	$76,779 69	30
Total Expenses	$187,393 73	$246,051 06	31
Deduct Power Sold	....	....	32
Total Cost of Operations Before Dealing with Interest	$187,393 73	$246,051 06	33
Average Number of Arc Lamps	1,710	2,893	34
Cost per Arc Lamp (Exclusive of Interest)	$109 00	$85 32	35
Balance being Excess of Expenses over Revenue	$187,297 73	$246,051 06	36
Profit and Loss Account:			
Debits:			
Depreciation of Land	....	....	37
Current Purchased	....	$379 62	38
Rented Lights	$56,785 14	55,221 86	39
Other Purposes	627 39	850 00	40
Total Debits	$57,412 53	$55,951 38	41
Total	$244,710 26	$302,002 44	42
From which Deduct:			
Profit on Sale of Plant at Throop Street	....	....	43
Balance being Net Expenditure	$244,710 26	$302,002 44	44

---

*After deducting cost of maintaining lamps, current for which was supplied

	1900.	1901.	1902.	1903.	1904.	1905.	Total.
1	$2,521 68	$2,275 92	$6,513 01	$6,834 26	$6,845 92	$6,845 92	$31,836 71
2	802 56	165 94	....	392 42	2,159 78	2,222 06	8,722 69
3	$3,324 24	$2,441 86	$6,513 01	$7,226 68	$9,005 70	$9,067 98	$40,559 40
4	$86,276 31	$80,064 15	$79,805 37	$88,435 28	$94,846 66	$102,669 50	$849,212 55
5	3,209 36	3,657 56	3,155 90	3,300 40	3,116 17	4,211 76	40,111 70
6	17,950 64	22,929 20	23,838 00	25,265 20	26,193 20	59,640 00	213,818 40
7	42,254 99	38,153 87	39,479 48	42,299 29	46,127 54	52,075 76	626,780 67
8	1,505 73	1,308 57	656 61	202 03	632 29	2,102 06	13,684 93
9	9,948 27	8,951 02	9,551 98	10,253 64	11,663 78	13,892 87	114,753 61
10	5,257 99	11,405 97	4,236 05	3,430 63	4,169 00	3,268 38	62,649 57
11	2,164 14	1,917 65	2,117 87	1,526 09	1,548 11	4,053 13	76,797 99
12	$168,567 43	$168,387 99	$162,841 26	$174,712 56	$188,296 75	$241,913 46	$1,997,809 42
13	$36,367 94	$41,625 64	$43,256 65	$49,751 64	$50,112 67	*$54,391 89	$430,386 45
14	3,158 00	4,441 70	2,982 14	1,976 44	1,731 55	1,523 46	49,411 18
15	511 31	985 23	1,674 19	1,843 96	1,250 60	....	12,762 81
16	18,681 40	21,114 85	22,280 09	18,170 92	15,485 06	*18,492 45	177,673 15
17	11,642 51	14,528 58	18,277 21	16,706 03	17,916 06	23,980 15	143,102 91
18	17,453 36	14,122 59	10,072 10	16,277 37	15,882 39	*17,753 45	129,322 17
19	1,630 56	1,537 32	1,250 00	1,419 76	1,561 07	1,790 48	20,333 19
20	$89,445 08	$98,355 91	$99,792 38	$106,146 12	$103,939 40	$117,931 88	$962,991 86
21	$3,706 66	$4,379 50	$4,384 40	$4,375 00	$4,722 82	$4,829 54	$53,499 87
22	627 17	83 80	105 05	414 14	191 33	249 56	3,550 30
23	25 00	85 80	55 00	....	35 00	1,032 83	1,487 73
24	500 00	500 00	500 00	500 00	500 00	500 00	9,000 00
25	1,000 00	1,500 00	1,500 00	1,500 00	1,500 00	1,500 00	15,500 00
26	225 71	553 49	1,585 00	579 21	334 22	63 25	6,095 30
27	17,766 20	11,976 43	11,444 03	12,122 13	13,319 76	18,505 00	193,642 20
28	4,080 00	4,090 00	4,100 00	4,100 00	4,100 00	4,481 00	45,461 00
29	69,686 07	76,850 93	77,963 06	74,833 99	73,206 16	100 000 00	941,610 43
30	$97,616 81	$100,019 95	$101,636 54	$98,424 47	$97,908 29	$131,161 18	$1,269,846 83
31	$355,629 32	$366,763 85	$364,270 18	$379,283 15	$390,144 44	$491,006 52	$4,230,648 11
32	....	....	2,092 25	....	....	....	2,092 25
33	$355,629 32	$366,763 85	$362,177 93	$379,283 15	$390,144 44	$491,006 52	$4,228,555 86
34	3,867	4,305	4,508	4,827	5,034	5,743	42,399
35	$91 96	$85 19	$80 34	$78 57	$77 50	$85 49	$99 73
36	$352,305 08	$364,321 99	$355,664 92	$372,056 47	$381,138 74	$481,938 54	$4,187,996 46
37	....	....	....	....	....	$6,798 40	$6,798 40
38	$1,126 48	....	....	....	....	8,874 06	10,380 06
39	69,015 81	$68,794 50	$62,233 98	$64,853 11	$69,389 94	64,881 14	816,137 17
40	....	1,092 43	....	....	....	2,248 00	7,373 04
41	$70,142 29	$69,886 92	$62,233 98	$64,853 11	$69,389 94	$82,801 60	$840,688 67
42	$422,447 37	$434,208 92	$417,898 90	$436,909 58	$450,528 68	$564,740 14	$5,028,685 13
43	....	....	....	....	....	....	26,109 72
44	$422,447 37	$434,208 92	$417,898 90	$436,909 58	$450,528 68	$564,740 14	$5,002,575 41

by the Commonwealth Electric Company.

EXHIBIT "B"—COST OF LAND, CONSTRUCTION AND EQUIPMENT OF THE PLANTS AND EXTENSION OF THE SYSTEM.—From the Year 1887 to December 31, 1905.

Year.	Balance as at January 1. Construction.	Balance as at January 1. Land.	Depreciaton at 7.39 Per Cent. on Reducing Values Excluding Land.	Construction Balance After Deducting Depreciation.	Additions During Year. Construction.	Additions During Year. Land.	Balance as at December 31. Construction.	Balance as at December 31. Land.
1887..	....	....	....	....	$1,916 33	....	$1,916 33	....
1888..	$1,916 33	....	$141 61	$1,774 72	135,087 97	....	136,862 69	....
1889..	136,862 69	....	10,114 15	126,748 54	258,900 00	$35,340 50	385,648 54	$35,340 50
1890..	385,648 54	$35,340 50	28,499 41	357,149 13	259,590 47	....	616,739 60	35,340 50
1891..	616,739 60	35,340 50	45,577 02	571,162 58	158,413 36	....	729,575 94	35,340 50
1892..	729,575 94	35,340 50	53,915 63	675,660 31	37,018 55 *80,849 78	*23,040 50	631,829 08	12,300 00
1893..	631,829 08	12,300 00	46,692 13	585,136 95	21,794 71	973 40	606,931 66	13,273 40
1894..	606,931 66	13,273 40	44,852 21	562,079 45	48,616 39	30,501 84	610,695 84	43,775 24
1895..	610,695 84	43,775 24	45,130 39	565,565 45	69,202 91	....	634,768 36	43,775 24
1896..	634,768 36	43,775 24	46,909 35	587,859 01	34,026 21	....	621,885 22	43,775 24
1897..	621,885 22	43,775 24	45,957 28	575,927 94	39,861 26	....	615,789 20	43,775 24
1898..	615,789 20	43,775 24	45,506 79	570,282 41	184,457 64	....	754,740 05	43,775 24
1899..	754,740 05	43,775 24	55,775 25	698,964 80	244,013 68	....	942,978 48	43,775 24
1900..	942,978 48	43,775 24	69,686 07	873,292 41	166,639 52	....	1,039,931 93	43,775 24
1901..	1,039,931 93	43,775 24	76,850 93	963,081 00	91,900 05	....	1,054,981 05	43,775 24
1902..	1,054,981 05	43,775 24	77,963 06	977,017 99	35,618 40	12,525 00	1,012,636 39	56,300 24
1903..	1,012,636 39	56,300 24	74,833 79	937,802 60	51,450 47	....	989,253 07	56,300 24
1904..	989,253 07	56,300 24	73,205 58	916,047 49	103,910 13	....	1,019,957 62	56,300 24
1905..	1,019,957 62	56,300 24	‡100,000 00	919,957 62	316,247 72	†6,798 40	‖1,266,205 34	‖49,501 84
			$941,610 65		2,207,815 99	49,501 84	1,266,205 34	49,501 84

---

* Throop Street Plant sold to the Metropolitan Elevated R. R. Company for $100,000.00, together with seven lots, valued at $30,000.00, the profit on the sale of the plant being $26,109.72.

† Depreciation to reduce book value of land to value as stated by the Engineers, Messrs. Stebbins & Phelps.

‡ Depreciation as stated by the Engineers, Messrs. Stebbins & Phelps.

‖ Value as appraised by the Engineers, Messrs. Stebbins & Phelps.

EXHIBIT "D"—EXPENDITURES ON ACCOUNT OF RENTED LIGHTS AND CURRENT PURCHASED.—From the Year 1889 to December 31, 1905.

Year.	Company.	Cost Per Lamp Rented Outright.	Cost Per Lamp Rented Jointly (⅔).	Cost Per Lamp Rented Jointly (⅓).	Total Cost of Current Purchased.	Total Cost of Rented Lamps.	Average for Year. Year.	Average for Year. No. of Lamps Rented Outright.	Average for Year. Cost Per Lamp Rented Outright.
1889	Edgewater Light Company	$30 00	....	....	......	$190 00	1889	38	......
1890	Edgewater Light Company	30 00	....	....	......	883 50	1890	38	$177 95
	Chicago Arc Light & Power Co	175 00	90 00	60 00	......	17,727 39	....	93	
1891	Chicago Arc Light & Power Co	175 00	90 00	60 00	......	22,523 88	1891	166	174 33
	People's Light & Power Co	172 00	....	....	......	....	....	..	......
	People's Light & Power Co	175 00	....	....	......	7,615 00	....	..	......
1892	People's Light & Power Co	175 00	....	....	......	7,865 85	1892	174	174 63
	Chicago Arc Light & Power Co	175 00	90 00	60 00	......	23,719 39	....	..	......
1893	Chicago Arc Light & Power Co	175 00	90 00	60 00	......	16,710 89	1893	184	155 62
	Chicago Arc Light & Power Co	137 50	68 76	45 84	......	....	....	..	......
	Chicago Edison Company	137 50	68 75	45 83	......	4,746 33	....	..	......
	People's Light & Power Co	175 00	....	....	......	7,913 46	....	..	......
	People's Light & Power Co	168 00	....	....	......	....	....	..	......
	People's Light & Power Co	137 50	....	....	......	....	....	..	......
1894	People's Light & Power Co	137 50	....	....	......	9,504 11	1894	203	137 38
	Chicago Edison Company	137 50	68 75	45 83	......	19,009 05	....	..	......
1895	Chicago Edison Company	137 50	68 75	45 83	......	1,787 52	1895	524	103 38
	People's Light & Power Co	137 50	....	....	......	22,706 35	....	..	......
	People's Light & Power Co	105 00	....	....	......	....	....	..	......
	Peoples Elec. Light & Mot. Power Co.	137 50	68 75	45 83	......	22,301 17	....	..	......
	Peoples Elec. Light & Mot. Power Co.	105 00	52 50	35 00	......	....	....	..	......
	Hyde Park Elec. Light & Power Co.	164 33	....	....	......	7,805 71	....	..	......
	Hyde Park Elec. Light & Power Co.	159 03	....	....	......	....	....	..	......
	Mutual Elec. Light & Power Co.	82 00	....	....	......	633 73	....	..	......
1896	Mutual Elec. Light & Power Co.	82 00	....	....	......	758 50	1896	480	113 28
	Peoples Elec. Light & Mot. Power Co.	137 50	52 50	35 00	......	20,990 63	....	..	......
	Peoples Elec. Light & Mot. Power Co.	105 00	....	....	......	....	....	..	......
	Chicago Edison Company	137 50	....	....	......	8,112 48	....	..	......
	Hyde Park Elec. Light & Power Co.	23014*	....	....	......	....	....	..	......
	Hyde Park Elec. Light & Power Co.	02945*	....	....	......	6,755 97	....	..	......

Year.	Company.	Cost Per Lamp Rented Outright.	Cost Per Lamp Rented Jointly (½).	Cost Per Lamp Rented Jointly (⅓).	Total Cost of Current Purchased.	Total Cost of Rented Lamps.	Average for Year Year.	Average for Year No. of Lamps Rented Outright.	Average for Year Cost Per Lamp Rented Outright.
1896	People's Light & Power Co.	$137 50	....	....	......	$18,398 31	....	..	......
	People's Light & Power Co.	105 00	....	....	......	....	....	..	......
1897	People's Light & Power Co.	137 50	....	....	......	34,260 48	1897	192	$113 23
	People's Light & Power Co.	105 00	....	....	......	....	....	..	......
	Hyde Park Elec. Light & Power Co.	23014*	....	....	......	7,045 99	....	..	......
	Hyde Park Elec. Light & Power Co.	02945*	....	....	......	....	....	..	......
	Peoples Elec. Light & Mot. Power Co.	105 00	....	$35 00	......	6,883 52	....	..	......
	Chicago Edison Company	137 50	....	....	......	8,112 48	....	..	......
1898	Chicago Edison Company	137 50	....	....	......	8,003 34	1898	515	109 10
	People's Light & Power Co.	137 50	....	....	......	5,138 82	....	..	......
	People's Light & Power Co.	105 00	....	....	......	....	....	..	......
	Peoples Elec. Light & Mot. Power Co.	105 00	....	35 00	......	5,167 02	....	..	......
	Hyde Park Elec. Light & Power Co.	23014*	....	....	......	....	....	..	......
	Hyde Park Elec. Light & Power Co.	02945*	....	....	......	1,781 93	....	..	......
	Commonwealth Electric Company	103 00	$51 50	34 33⅓	......	36,694 03	....	..	......
1899	Commonwealth Electric Company	103 00	51 50	34 33⅓	$379 52	55,221 86	1899	529	103 28
1900	Commonwealth Electric Company	103 00	51 50	34 33⅓	1,126 48	54,980 07	1900	665	102 84
	Cicero Light, Heat & Power Co.	102 50	....	....	......	13,353 24	....	..	......
	Chicago Suburban W. & Light Co.	70 00	....	....	......	682 50	....	..	......
1901	Chicago Suburban W. & Light Co.	70 00	....	....	......	....	1901	671	101 58
	Chicago Suburban W. & Light Co.	102 50	....	....	......	7,434 49	....	..	......
	Commonwealth Electric Company	103 00	....	....	......	61,360 01	....	..	......
1902	Commonwealth Electric Company	103 00	....	....	......	50,643 36	1902	600	102 66
	Chicago Suburban W. & Light Co.	102 50	....	....	......	11,590 62	....	..	......
1903	Chicago Suburban W. & Light Co.	8 55†	....	....	......	12,300 32	1903	611	102 82
	Commonwealth Electric Company	103 00	....	....	......	52,552 79	....	..	......
1904	Commonwealth Electric Company	103 00	51 50	34 33	......	56,419 15	1904	656	102 92
	Chicago Suburban W. & Light Co.	8 55†	....	....	......	12,970 79	....	..	......
1905	Chicago Suburban W. & Light Co.	8 55†	....	....	......	9,945 30	1905	643	102 52
	Commonwealth Electric Company	103 00	....	....	8,874 06	54,935 84	....	..	......
	Total				$10,380 06	$816,137 17			

---

* Per night.

† Per month.

EXHIBIT "E."

COMPARATIVE STATEMENT SHOWING THE COST OF OPERATIONS AND THE PROBABLE COST TO THE CITY HAD THE ARC LAMPS BEEN RENTED (EXCLUSIVE OF INTEREST).

From the Year 1888 to December 31, 1905.

Year.	*Average Number of Lamps Owned and Operated.*	*Cost of Operations.*		*Probable Cost if Rented.*		***Gain or** Loss to City Through Operation of Its Plants.*	*Probable Cost if Rented as Per the Report of the Department of Electricity.*		
		Per Arc Lamp Per Annum.	*Amount.*	*Average Per Arc Lamp Per Annum.*	*Amount.*		*Per Lamp.*	*Amount.*	*Gain or Loss to City Through Operation of Its Plants.**
1888........	192	$87 15	$16,732 29	$177 95	$34,166 40	$17,434 11	$200 00	$38,400 00	$21,667 71
1889........	297	199 68	59,304 61	177 95	52,851 15	*6,453 46*	185 00	54,945 00	*4,359 61*
1890........	900	129 61	116,824 79	177 95	160,155 00	43,330 21	175 00	157,500 00	40,675 21
1891........	993	174 76	173,434 33	174 33	173,109 69	*324 64*	175 00	173,775 00	340 67
1892........	1,102	160 04	176,365 24	174 63	192,442 26	16,077 02	175 00	192,850 00	16,484 76
1893........	1,112	164 64	183,081 00	155 62	173,049 44	*10,031 56*	156 25	173,750 00	*9,331 00*
1894........	1,108	158 47	175,589 10	137 38	152,217 04	*23,372 06*	137 50	152,350 00	*23,239 10*
1895........	1,116	166 46	185,772 52	103 38	115,372 08	*70,400 44*	137 50	153,450 00	*32,322 52*
1896........	1,254	150 27	188,441 07	113 28	142,053 12	*46,387 95*	137 50	172,425 00	*16,016 07*
1897........	1,438	121 39	174,560 91	113 23	162,824 74	*11,736 17*	137 50	197,725 00	23,164 09
1898........	1,710	109 00	187,393 73	109 10	186,561 00	*832 73*	105 00 137 50	226,285 00	38,891 27
1899........	2,893	85 32	246,051 06	103 28	298,789 04	52,737 98	"	355,635 00	109,583 94
1900........	3,867	91 96	355,629 32	102 84	397,682 28	42,052 96	103 00 137 50	458,020 50	102,391 18
1901........	4,305	85 19	366,763 85	101 58	437,301 90	70,538 05	"	503,928 00	137,164 15
1902........	4,508	80 34	362,177 93	102 66	462,791 28	100,613 35	"	524,837 00	162,659 07
1903........	4,827	78 57	379,283 15	102 82	496,312 14	117,028 99	"	559,936 50	180,653 35
1904........	5,034	77 50	390,144 44	102 92	518,099 28	127,954 84	"	581,533 50	191,389 06
1905........	5,743	85 49	491,006 52	102 52	588,772 36	97,765 84	"	654,767 50	163,760 98
	42,399	$99 73	$4,228,555 86	$111 90	$4,744,550 20	$515,994 34	$125 76	$5,332,113 00	$1,103,557 14

---

* Figured by Marwick, Mitchell & Company, based on Cost of Operations, as above.

(Subject to Report dated April 30, 1907)

EXHIBIT "F."

SIMPLE INTEREST AT 4 PER CENT PER ANNUM ON COST OF CONSTRUCTION, OPERATIONS LESS DEPRECIATION, AND PROBABLE COST IF RENTED.

From the Year 1888 to December 31, 1905.

Year.	On Cost of Construction.	On Cost of Operations (Exclusive of Depreciation).	On Probable Cost if Rented.	On Probable Cost if Rented as per Estimate of Department.
1888....	$2,816 73	$331 82	$683 32	$768 00
1889....	11,364 96	1,647 45	2,423 66	2,634 90
1890....	22,441 60	4,597 72	6,683 78	6,883 80
1891....	30,801 66	8,721 38	13,349 06	13,509 30
1892....	32,032 48	13,727 56	20,660 12	20,841 80
1893....	31,750 44	18,904 34	27,969 94	28,173 80
1894....	33,788 16	24,246 83	34,475 26	34,695 80
1895....	36,754 58	29,674 40	39,827 08	40,811 80
1896....	38,819 16	35,317 86	44,975 58	47,329 30
1897....	40,256 90	40,720 57	51,073 12	54,732 30
1898....	44,783 35	46,130 40	58,060 86	63,212 50
1899....	53,352 72	52,773 65	67,767 86	74,850 90
1900....	61,565 78	62,298 01	81,697 28	91,124 00
1901....	66,736 56	73,815 20	98,396 94	110,362 96
1902....	69,527 42	85,297 70	116,398 82	130,938 26
1903....	71,529 32	97,071 00	135,580 88	152,633 73
1904....	74,636 52	109,498 78	155,869 10	175,463 15
1905....	83,639 68	123,657 68	177,406 52	200,189 15
	$807,248 02	$828,232 35	$1,133,299 18	$1,249,155 45

EXHIBIT "G."

COMPOUND INTEREST AT 4 PER CENT. PER ANNUM ON COST OF CONSTRUCTION OPERATIONS LESS DEPRECATION, AND PROBABLE COST IF RENTED.

From the Year 1888 to December 31, 1905.

Year.	On Cost of Construction.	On Cost of Operations (Exclusive of Depreciation).	On Probable Cost of Rented Service.	On Probable Cost of Rented Service as per Estimate of Department.
1888....	$2,818 25	$331 82	$683 32	$768 00
1889....	11,477 58	1,690 72	2,450 98	2,665 62
1890....	23,013 44	4,477 42	6,809 14	7,021 12
1891....	32,294 02	8,980 18	13,746 78	13,927 50
1892....	35,416 60	14,345 56	21,607 72	21,817 08
1893....	35,951 24	20,026 16	29,781 86	30,021 76
1894....	39,427 00	26,242 50	37,478 46	37,744 64
1895....	43,970 50	32,719 77	44,329 40	45,370 44
1896....	47,703 88	39,672 02	51,251 06	53,702 74
1897....	51,183 38	46,631 61	59,398 64	63,253 86
1898....	57,717 19	53,937 90	68,762 34	74,264 18
1899....	68,595 24	62,738 67	81,219 86	88,873 18
1900....	79,562 10	74,772 57	98,398 04	108,701 20
1901....	87,904 96	89,250 08	119,023 62	132,288 20
1902....	94,222 02	104,324 40	141,796 86	158,155 02
1903....	99,992 80	120,281 08	166,250 80	186,176 60
1904....	107,085 72	137,520 10	192,605 06	216,453 10
1905....	120,203 01	157,179 80	222,886 68	249,837 31
	$1,098,775 56	$965,232 96	$1,259,990 62	$1,491,041 73

EXHIBIT "H"—COMPARATIVE STATEMENT SHOWING THE COST OF CONSTRUCTION OPERATIONS, AND PROBABLE COST IF RENTED, INCLUDING SIMPLE AND COMPOUND INTEREST. From the Year 1888 to December 31, 1905.

	Amount with Simple Interest.	*Amount with Compound Interest.*	*Simple and Compound Difference.*
Cost of construction, as per Exhibit "B"	$2,264,116 23	$2,264,116 23	....
Cost of operations, as per Exhibit "C"	4,228,555 86	4,228,555 86	....
	$6,492,672 09	$6,492,672 09	....
Less depreciation of plants, included in cost of operations, as per Exhibit "B"	941,610 65	941,610 65	....
	$5,551,061 44	$5,551,061 44	....
Interest on cost of construction and operations, less depreciation, as per Exhibits "F" and "G"	1,635,480 37	2,034,008 52	$398,528 15
	$7,186,541 81	$7,585,069 96	....
Less appraised value of plant December 31, 1905	1,315,707 18	1,315,707 18	....
Total	$5,870,834 63	$6,269,362 78	$398,528 15
Probable cost if rented, as per Exhibit "E"	$4,744,550 20	$4,744,550 20	....
Interest thereon, as per Exhibits "F" and "G"	1,133,299 18	1,359,890 62	226,591 44
Total	$5,877,849 38	$6,104,440 82	$226,591 44
Probable cost if rented, estimated by the department, as per Exhibit "E"	$5,332,113 00	$5,332,113 00	....
Interest thereon, as per Exhibits "F" and "G"	1,249,155 45	1,491,041 73	$241,886 28
Total	$6,581,268 45	$6,823,154 73	$241,886 28
SUMMARY.			
Cost of construction, operations less depreciation, and interest, less appraised value of plant at December 31, 1905, as above	$5,870,834 63	$6,269,362 78	$398,528 15
Probable cost if rented, including interest, as above	5,877,849 38	6,104,440 82	226,591 44
Estimated gain or *loss to the city	$7,014 75	*$164,921 96	*$171,936 71
Probable cost if rented, estimated by department, and interest, as above	$6,581,268 45	$6,823,154 73	$241,886 28
Cost of construction, operations less depreciation, and interest, less appraised value of plant at December 31, 1905, as above	5,870,834 63	6,269,362 78	398,528 15
Estimated gain or *loss to the city	$710,433 82	$553,791 95	*$156,641 87

EXHIBIT "1"—ESTIMATED CONSUMPTION OF CITY WATER IN CHICAGO MUNICIPAL ELECTRIC LIGHTING PLANTS. Years 1888 to 1904, Inclusive.

	Year.	Number of Lamps at 4,000 (Estimated) Lamp Hours.	Equivalent Horse Power.	Note "1" Below.	Gallons of Water Consumed per Year (Thousands).	Cost per Year. At City Water Rates Note "2" Below).	Cost per Year. Based on Cost in 1905 to Water Dept. Per M. M. & Co. .02234 Per M.
Each lamp requires 1 I. H. P.	1888	192	192	N.	2,304	$223 92	$51 47
	1889	297	297	N.	3,564	324 72	79 62
	1890	900	900	N.	10,800	903 60	241 27
	1891	993	993	N.	11,916	992 88	255 20
	1892	1,102	1,102	N.	13,224	1,097 52	295 42
	1893	1,112	1,112	N.	13,344	1,107 12	298 10
Each lamp requires .8 I. H. P.	1894	1,108	886	N.	10,632	890 16	237 52
	1895	1,116	893	N.	10,716	906 88	239 40
	1896	854	683	N.	8,196	4,791 28	1,326 91
		400	320	C.	51,200		
	1897	1,002	802	N.	9,624	5,167 44	1,462 47
		436	349	C.	55,840		
	1898	855	684	N.	8,208	8,398 48	2,628 26
		855	684	C.	109,440		
Each lamp requires .7 I. H. P.	1899	724	507	N.	6,084	13,198 16	5,561 86
		2,169	1,518	C.	242,880		
	1900	969	678	N.	8,136	17,950 64	7,434 22
		2,898	2,029	C.	324,640		
	1901	4,305	3,014	C.	482,240	22,929 20	10,773 24
	1902	4,508	3,156	C.	504,960	23,838 00	11,280 81
	1903	4,827	3,379	C.	540,640	25,265 20	12,077 90
	1904	5,034	3,524	C.	563,840	26,193 20	12,596 19

Note "1" "C," engines operated condensing, using 40 gallons of water per I. H. P. Hr. or 160,000 gallons per year of 4,000 hours.
"N," engines operated non-condensing, using 3 gallons of water per I. H. P. Hr. or 12,000 gallons per year of 4,000 hours.

Note "2." City water rates per year (based on monthly quantities). Up to 1,980 M. gals., 10c. per M. gals. From 1,980 M. to 60,000 M. gals., 8c. per M. gals. Next 60,000 M. gals., 6c. per M. gals. Above 120,000 M. gals., 4c. per M. gals.

LABOR AND POLITICS

United States Water, Gas and Electricity Works

(Answers to Questions in Schedule II)

By JOHN R. COMMONS and J. W. SULLIVAN

NOTE.—Some of the questions included in Schedule II. have required a large amount of investigation in order to discover the actual situation and to reconcile conflicting claims. Consequently the brief answers submitted below are not adequate and they should be supplemented by the text of the reports on pages 136-158, 490-536, and 749-758 of this volume. This applies especially to the following: Chapter E, Organization, Questions 22, 23, 24, 27, 35, 36, 38, 39; Chapter F, Political Conditions, Question 5.

Consult the foregoing reports for answers to the following questions:

E 4. Do political considerations influence selection?
E 5. Is the board bi-partisan or non-partisan?
E 25. Do political considerations influence appointment or removal?
E 33. How are the subordinate officials and employees selected?
E 34. How and by whom are they discharged?
F 5. Have the votes of employees affected city elections?
F 6. Have they used political power to secure higher wages, fewer hours, etc.?
F 7. Have candidates for office promised higher wages, better hours, etc., for employees?
F 8. Are employees active in party work?
F 9. Are they expected or required to pay political assessments?
F 10. What evidence is there of the influence of private companies upon the nomination and election of members of the franchise granting and franchise controlling authorities?

E—ORGANIZATION.

Question 1. What is the supreme governing body of the service, whether city council, board, commission, board of directors, etc.?

South Norwalk, Conn. (Electric light and power.) Board of Electrical Commissioners.

Syracuse, N. Y. (Water.) Commissioner of Public Works.

Allegheny, Penn. (Electric lighting.) City council, through three joint committees, Finance, Public Works and a sub-committee of the latter on lighting.

Wheeling, W. Va. (Gas.) City council (first branch, sixteen members, elected for four years; second branch, twenty-eight members, elected for two years); it acts in regard to financial details through a Board of Gas Trustees.

Cleveland, Ohio. (Water.) Board of Public Service.

Detroit, Mich. (Electric lighting.) Public Lighting Commission.

Chicago, Ill. (Water.) City council, through the Commissioner of Public Works, who is the superior of the city engineer (Engineer in charge of division of water supply and the Superintendent of Water.) The latter official is the head of the Assessor's office, Inspector's Division, Bureau of Water Rate Collection, and the meter rates, shut-off and meter mechanical sub-departments.

(Electric lighting.) City Council, through the City Electrician, head of the Department of Electricity, which operates the Bureau of Gas Lighting, Bureau of Alarm Telegraph, Bureau of Police Telegraph, Bureau of Electrical Inspection, Bureau of Automobile Registry, the Bureau of Electrical Construction and the Bureau of Municipal Lighting.

Richmond, Va. City council composed of two bodies, aldermen and council men. A joint committee of eleven aldermen and councillors administers the gas works, under direction of the two legislative bodies. The council elects the superintendent in joint session, but the joint committee appoints the clerk who has charge of the commercial side. Mayor elected by people.

Question 2. Number of members.

South Norwalk. Three.

Syracuse. One.

Allegheny. Finance, sixteen, Sub-committee on Lighting, six, Public Works, twenty-two.

Wheeling. Three, in the Board.

Cleveland. Three.

Detroit. Six.

Chicago. City council has seventy members (two aldermen to each ward).

Richmond. Twenty-one aldermen, thirty-five councilmen, joint committee eleven.

Question 3. Method of selection of members, including nominations and election.

South Norwalk. By city council.

Syracuse. Appointed by the mayor.

Allegheny. Members of joint committees appointed by presidents of two chambers.

Wheeling. Board chosen in political caucuses of council members, then voted as in council.

Cleveland. Elected at the polls every two years.

Detroit. Appointed by the mayor.

Chicago. City council. Party nominations and election at the polls.

Richmond. White primaries, eliminate all negroes and as many poor whites as neglect to pay poll and road tax of $1.50 a year.

Question 6. Term.

South Norwalk. Three years; one chosen by council annually.

Syracuse. Commissioner, two years.

Allegheny. Select councilmen, four years, common, two years.

Wheeling. Board, two years.

Cleveland. Two years.

Detroit. Six years.

Chicago. Two years; one-half elected each year.

Richmond. Aldermen, four years, councilmen, two years, mayor, two years.

Question. Do all retire at the same time?

South Norwalk. One each year.

Syracuse. One man.

Allegheny. Select councilmen, four years, common, two years.

Wheeling. Board, yes.

Cleveland. Yes.

Detroit. One each year.

Chicago. City council, one-half each year.

Richmond. No.

Question 8. State salaries or allowances for services in connection with the service.

South Norwalk. The ordinances authorize compensation, but none has been given.

Syracuse. Commissioner, $4,000.

Allegheny. No salaries, to councilmen or committeemen.

Wheeling. Board members, $100 a year, councilmen draw no salary.

Cleveland. $5,000, not charged to water works, but to general fund.

Detroit. No salaries; no perquisites.

Chicago. Councilmen, $1,500 per year.

Richmond. Unsalaried..

Question 9. May they also hold other public office?

South Norwalk. No other municipal office; may hold state or national.

All others, no.

Question 10. Do they always, generally, exceptionally, or never?

South Norwalk. See reply to number 9.

All others, no.

Question 11. May they also conduct private business?

Yes, all.

Question 12. What has been the custom?

South Norwalk. Business or an engineer have been the commissioners.

Syracuse. Present commissioner does not.

Others, yes.

Question 13. How often does governing bodies meet?

South Norwalk. Weekly; Saturday afternoons.

Syracuse. One man.

Allegheny. Regular meetings monthly; special meetings may be called.

Wheeling. Trustees meet twice a month; 15th and last day.

Cleveland. Once a week.

Detroit. Regular meeting once a month; special meeting on call.

Chicago. Council meets weekly, except during summer vacation. (Electric lighting.) "City council does not interfere with the department of electricity, except in making the annual appropriations and big contracts."—City Electrician.

Richmond. ?

Question 14. Have they a technical knowledge of the service?

South Norwalk. None.

Syracuse. Commissioner has none.

Allegheny. No.

Wheeling. No.

Cleveland. No; two are business men; one professional.

Detroit. Not of electricity.

Chicago. Councilmen, no.

Richmond. No.

Question 15. What is the scope of the authority vested in this body?

South Norwalk. Almost absolute; subject to council or vote of the citizens on appropriations or extensive enlargements.

Syracuse. Full.

Allegheny. Divided authority; Director of public works and Superintendent make recommendations to committee on finance and to sub-committee on lighting and public works committee; then council is reached.

Wheeling. Trustees sign pay rolls and bill-checks.

Cleveland. Control.

Detroit. General supervision and management; the commission is sub-divided into committees—executive, Auditory, supplies.

Chicago. Make appropriations and pass ordinances regulating the service; forty-seven votes carry a proposal over the mayor's veto. (Electric lighting.) "The entire management is in the hands of the City Electrician. He gets the approval of the mayor and the common council when necessary."—City Electrician.

Richmond. Committee reports to council and is governed by latter.

Question 16. Is it fully exercised in practice?

South Norwalk. Yes.

Syracuse. It is; in all particulars.

Allegheny. The mayor is really final authority.

Wheeling. Trustees' actual authority is small—is practically only an auditing body.

Cleveland. Yes.

Detroit. "Yes; with constant supervision."—Secretary.

Chicago. Water, yes.

Richmond. (Electric lighting.) See 15.

Question 17. If there is any intermediate person or body between the supreme governing body as above described and the chief executive officer, give its constitution, organization, functions, etc.

South Norwalk. None.

Syracuse. None.

Allegheny. "City council supreme."—Gray.

"Next below the mayor is the Director of Public Works, who makes all the appointments; next is the Superintendent, who is a politician."—Williams.

Wheeling. Board of Gas Trustees is intermediate, conflicting authority.

Cleveland. None.

Detroit. None.

Chicago. Water committee is merely an advisory body, reporting to council; Finance committee reports appropriations.

(Electric lighting.) No.

Richmond. Council and joint committee as above.

Question 18. What is the official title of the chief executive officer (or officers, if more than one of equal rank)?

Question 19. Is the head of the engineering service subordinate to the chief executive officer, co-ordinate with him or united in one man?

Question 20. Is the head of the engineering service an engineer by profession?

Question 21. Is the chief executive officer an engineer by profession?

South Norwalk. General Superintendent and city electrical engineer (one man) an engineer by profession.

Syracuse. Commissioner of Public Works. The superintendent is ostensibly in charge of engineering work, but this is actually conducted by the Chief Inspector, who is a civil engineer.

Allegheny. Of the Bureau, Director of Public Works is the chief; Superintendent is subordinate to him; "The superintendent is a practical man."—Gray. "At present there is no electrical engineer at the works."—Williams.

Wheeling. Superintendent at Gas Works; Secretary, in office; the superintendent is not a graduated engineer.

Cleveland. Superintendent of Division of Water; he is in full charge, but the first Assistant Engineer does most of the practical work, and is an engineer by profession.

Detroit. City electrician and general superintendent (one man); was formerly a stationary engineer.

Chicago. (Water) Commissioners of Public Works, in general charge, is not an engineer; the city engineer and the engineer in charge of the water division are professional engineers.

(Electric lighting.) City Electrician has been in the electrical branch of the city service thirty-three years as lineman, batteryman, repairer, assistant operator, operator of fire alarm telegraph, superintendent of construction, twenty years and city electrician; claims direct responsibility to the council; makes a separate report for the department of electricity to the mayor.

Richmond. Superintendent has charge of physical plant; Bill clerk of commercial department.

Question 22. Does the supreme governing body actually determine the administration of the service or does it simply ratify the suggestions of the executive officer?

South Norwalk. Board has full power, but works in co-operation with general superintendent.

Syracuse. Commissioner determines the administration under the annual appropriation of the Board of Estimate and Apportionment; decides on salaries; is a member of the Board of Contract and Supply.

Allegheny. Usually ratify.

Wheeling. Board of Trustees does as much as the superintendent suggests; superintendent responsible for works, secretary for office.

Cleveland. Board ratifies recommendations of superintendent.

Detroit. City Electrician submits proposals to commission for decision.

Chicago. (Water.) Recommendations of commissioner are usually ratified.

(Electric lighting.) Ratifies.

Richmond. Controls. Superintendent's recommendations seldom ratified.

Question 23. How is the chief executive officer (or officers, if more than one of equal rank) selected?

South Norwalk. By the Electrical Commissioners.

Syracuse. By the Mayor.

Allegheny. Superintendent is selected by the Director of Public Works, subordinate to the Mayor.

Wheeling. By Board of Gas Trustees.

Cleveland. Pres't. law is, by the board; but the superintendent was in office at the time of the creation of the board by a new charter.

Detroit. Commission appoints City Electrician.

Chicago. (Water.) Commissioner nominated by the Mayor and confirmed by the council.

(Electric Lighting.) Advanced through all the grades; appointed to present position by Mayor, with the concurrence of council.

Richmond. Superintendent elected annually by joint session of aldermen and councilmen.

Question 24. How is he removed or discharged?

South Norwalk. By the Electrical Commissioners.

Syracuse. By the Mayor, under charter regulations.

Allegheny. By Director of Public Works on change of administration.

Wheeling. Change of political administration, or neglect of duties.

Cleveland. By the Board.

Detroit. By the commission.

Chicago. By Mayor, with consent of two-thirds of the council.

Richmond. Same.

Question 26. What is his term of office?

South Norwalk. Indefinite.

Syracuse. Two years; "unless removed" (charter).

Allegheny. Not ascertained.

Wheeling. Two years, unless sooner removed.

Cleveland. On good behavior.

Detroit. One year.

Chicago. (Water.) Engineer in charge subject to Mayor and council.

(Electric lighting.) City Electrician, two years.

Richmond. One year.

Question 27. Has he changed with each change in the city administration?

South Norwalk. Never been a change.

Syracuse. Commissioner and Superintendent change with party change.

Allegheny. Predecessor was in office from the beginning of the plant; present superintendent, four years. Same political party has been in power.

Wheeling. Subject to change with change of party administration.

Cleveland. No.

Detroit. No.

Chicago. (Water.) Yes; with change of politics.

(Electric lighting.) Since the public system was started there have been three heads.

Richmond. No.

Question 28. How long has the present incumbent served?

Norwalk. Ex-officio, five years; 1892 to 1897; directly, nine years, 1897 to 1906.

Syracuse. Five years; continuous party administrations.

Allegheny. Four years.

Wheeling. Superintendent, twelve years; party continuous in office; secretary, two years.

Cleveland. Five years.

Detroit. Six years.

Chicago. (Water.) Since May 1, 1906.

(Electric lighting.) Since May, 1905.

Richmond. Twelve years; 29 in the works.

Question 29. Does he devote all of his time to the business?

South Norwalk. Yes, since 1897.

Syracuse. Yes; to the administration of the Department of Public Works.

Allegheny. "Sure."—Gray.

"No; has just returned from a two months' vacation abroad."—Williams.

Wheeling. Yes.

Cleveland. By special action of the board the superintendent is permitted to act as expert for other cities at times and to investigate municipal questions elsewhere, his salary being deducted *pro rata*.

Detroit. Yes.

Chicago. Yes; between nine and five o'clock, work days.

Richmond. Yes.

Question 30. What was his annual salary or pay for last fiscal year?

South Norwalk. $2,000, to January 1, 1906; present year, $2,300.

Syracuse. $4,000 (Director of Public Works); $2,600, superintendent.

Allegheny. Superintendent, $2,500; Director of Public Works, $5,000.

Wheeling. Superintendent, $1,800; has been for twenty years. Secretary, $1,400.

Cleveland. $4,000; when absent on other business a proportionate deduction is made.

Detroit. $2,000.

Chicago. (Water.) Commissioner of Public Works, $6,000; City Engineer, $5,000; Engineer in charge of Water Division, $5,000.

(Electric lighting.) City Electrician, $5,000.

Richmond. $3,000.

Question 31. Give titles and annual salaries of the ten highest paid subordinates of the chief executive officer for the last fiscal year.

South Norwalk. See South Norwalk schedule, page six.

Syracuse. See Syracuse schedule, page six.

Allegheny. See Allegheny schedule, page six.

Wheeling. See Wheeling schedule, page six.

Cleveland. See Cleveland schedule, page six.

Detroit. See Detroit schedule, page six.

Chicago. See Chicago Water schedule, page six.

For Electric Lighting see Electric Lighting schedule, page five.

Richmond.

Question 32. Give number of salaried officers during last fiscal year.

South Norwalk. Total, four; average, four

Syracuse. Total, thirty-seven; average, thirty-seven.

Allegheny. See Question 31; table.

Wheeling. Superintendent, Inspector, Secretary.

Cleveland. (?)

Detroit. Fifteen.

Chicago. (Water.) Division of Water Supply (Public Works Department); Bureau of Water Commissioners, Collectors, Inspectors, etc., 281 (Sept. 1, 1906).

(Electric lighting.) Regularly on Electric Lighting Works, average 1905, 140; part time on Electric Lighting Works and part time on other department work, average 1905, 250; officials and clerks, part time on Electric Light work, five for seven months, six for five months.

Richmond. Superintendent, Bill clerk, eight deputy inspectors.

Question 35. What positions are filled for definite terms?

South Norwalk. None; except Board members.

Syracuse. No definite term.

Allegheny. Not ascertained.

Wheeling. Some at the works are winter hands only.

Cleveland. None.

Detroit. City Electrician; Secretary.

Chicago. Civil Service rules; indefinite terms.

Richmond. None in subordinate service.

Question 36. Who decides when and how many men are to be employed?

South Norwalk. General Superintendent, subject to the Board.

Syracuse. Commissioner; Chief Inspector makes recommendation as to number.

Allegheny. Superintendent.

Wheeling. Superintendent, employees and council.

Cleveland. Superintendent; subject to Board as to the maximum number of men to be employed in certain permanent positions; no limit as to wage workers.

Detroit. City Electrician; consults the Commission Executive Committee.

Chicago. (Water.) Heads of department bureaus.

(Electric lighting.) City Electrician; approval of Mayor and Council.

Richmond. Superintendent.

Question 37. What is the usual length of service?

South Norwalk. "Good men as long as they want to stay."

Syracuse. Construction force, the season office staff, year.

Allegheny. Not ascertained.

Wheeling. No stipulated term.

Cleveland. No changes during the last five years, except for good cause; very few changes previously in the few high test positions, except for good cause.

Detroit. "Sixty to sixty-five per cent. of the employees have been on the pay-rolls for ten years."—Secretary.

Chicago. No record.

Richmond. Permanent—very little change in force.

Question 38. What is the system of promotion?

South Norwalk. Merit; works employees preferred.

Syracuse. For office men, recommendation by Commissioner.

Allegheny. Is left to Superintendent.

Wheeling. No promotions; little skilled labor.

Cleveland. According to merit.

Detroit. By Superintendent and Commission.

Chicago. From lower to higher grades, by civil service examination; merit and seniority.

Richmond. Will of Superintendent.

Question 39. What considerations determine (*a*) Selection, (*b*) Dismissal?

South Norwalk. (*a*) "Qualifications; character; mental and physical capacity."

(*b*) Bad character; inefficiency.

Syracuse. (*a*) Judgment of Commissioner.

(*b*) Judgment of Commissioner.

Allegheny. Partly political, see text.

Wheeling. (*a*) "Political influence."

(*b*) "Political influence."

Cleveland. (*a*) Character of work under previous employers; tests imposed by the Superintendent; impressions made at interviews and short trial.

(*b*) Character of work done; a man's habits.

Detroit. (*a*) "Fitness"; (*b*) "Unfitness."

Chicago. (*a*) Ability to pass civil service examination and to prove qualifications in six months probation.

(*b*) Inability to perform duties; first six months, head of department has decision.

Richmond. Judgment of Superintendent.

Question 40. Is employment restricted to citizens?

South Norwalk. Citizens given first consideration.

Syracuse. Civil service positions, citizens.

Allegheny. Not always; supposed to be.

Wheeling. Yes.

Cleveland. Substantially but not exclusively.

Detroit. Yes.

Chicago. Yes; to resident of the state for one year; exceptions possible.

Richmond. Citizens and whites.

Question 41. Are there any age restrictions?

South Norwalk. No.

Syracuse.

Allegheny. Must be of age, except boys learning the trade.

Wheeling. Have to be a voter to hold a political job.

Cleveland. No.

Detroit. Must be of age; only one youth is employed, is learning the electrical trade.

Chicago. (Water.) Only boys are messengers and "water" boys at construction work.

(Electric lighting.) Must be of age.

Richmond. No.

Question 42. Are residents of the town given preference?

South Norwalk. Yes; all things equal.

Syracuse. Not for laborers.

Allegheny. Yes; charter requires six months' residence in the city.

Wheeling. Yes.

Cleveland. Yes.

Detroit. Yes.

Chicago. Yes; must be residents of the city one year, except certain skilled classes.

Richmond. Yes.

Question 43. Are positions distributed among the needy?

South Norwalk. In case of vacancy a capable, deserving, needy man is given a chance over others.

Syracuse. No policy in that respect.

Allegheny. No policy in that respect.

Wheeling. No policy in that respect.

Cleveland. No.

Detroit. No.

Chicago. Civil service rules govern.

Richmond. No.

F—POLITICAL CONDITIONS.

Question 1. What are the conditions of municipal suffrage?

South Norwalk, Conn. (Electricity.) "Unmolested function of American citizenship."

Syracuse, N. Y. (Water.) New York state law: One year in the state, four months in the county, ninety days in the election district.

Allegheny, Penn. (Electric lighting.) Pennsylvania state law: One year in the state; six months in the city; sixty days in the district; county tax (in 1905, 90 cents); road tax (24 cents) for Superintendent; laboring man, 33 cents.

Wheeling, W. Va. (Gas.) West Virginia state law: One year in the state; sixty days in the county; one year in the city, unless a property owner; residents of the county owning property in the city have a vote in the city.

Cleveland, Ohio. (Water.) Ohio state law: One year in the state; (?) thirty days in the county; (?) twenty days in the district.

Detroit, Mich. (Electric lighting.) State law of Michigan: One year in the state; three months in the county; ten days in the ward.

Chicago, Ill. (Water; Electric lighting.) Illinois state law: One year in the state; six months in the county; ninety days in the city; thirty days in the precinct.

Richmond, Va. White primaries. See E 3.

Question 2. Give the number of votes cast at the last city election and date of election.

South Norwalk. Number of votes, 938; date of election, October 2, 1906.

Syracuse. 1903, 26,818; 1905, 26,302; 1905, November 20.

Allegheny. 18,414, November, 1905.

Wheeling. "Vote runs from 10,000 to 11,000."—City official. Last municipal election January 26.

Cleveland. November 7, 1905, 74,830.

Detroit. November 8, 1904, 60,115.

Chicago. November 8, 1904, 359,983 for governor.

Richmond. Primaries and not elections decide.

Question 3. How many of the employees are voters?

South Norwalk. All who are of age.

Syracuse. All the staff; the Italian laborers usually are also.

Allegheny. All.

Wheeling. All.

Cleveland. Superintendent does not know.

Detroit. All.

Chicago. Fully ninety-nine per cent. of the employees.

Richmond. All.

Question 4. If any employees hold city office, state how many and what position.

South Norwalk. General Superintendent is City Electrician and Chief of the Fire Department; Clerk is Secretary of the Fire Department; a few of the men are members of the Fire Department.

Syracuse. None after positions to knowledge of Superintendent.

Allegheny. None.

Wheeling, Cleveland, Detroit, Chicago. Not known.

Richmond. None.

Question 11. To whom has free service been given?

South Norwalk. To no individual; a few hours sometimes contributed to church work or fairs for public good.

Syracuse. No free service to individuals.

Allegheny. See text.

Wheeling. Municipal buildings, hospitals, etc., by ordinance; no individuals.

Cleveland. The city departments; the state law requires a certain minimum amount to charity, hospitals and schools. None to individuals.

Detroit. Public lighting act makes provision.

Chicago. (Water.) Other city departments; religious, charitable, educational and military institutions not engaged in making profits.

(Electric lighting.) Streets; some of the water works stations; some of the fire department engine houses.

Richmond. Virginia Mechanic's Institute; Park Place Church Clock.

South Norwalk. No free service to individuals.

Syracuse. No free service to individuals.

Allegheny. No (legal) free service to individuals.

Wheeling. No free service to individuals; attempt of city solicitor to ignore his bill frustrated by secretary.

Cleveland. No free service to individuals.

Detroit. No free service to individuals (except possibly as noted in question 11).

Chicago (Water).

Question 12. Has the privilege of free service been considered an inherent right in connection with holding office and has it been granted voluntarily immediately upon taking office, or has it been made the subject of special request on the part of the office holder?

No free service to individuals.

Question 13. After the person enjoying the free service has left the office through the holding of which he has been granted free service, has the privilege still continued?

No free service to individuals.

Question 14. Who has had authority to grant free service?

Ordinance of City Council; assessor executes ordinance.

Question 15. What have been the rules in regard to free service?

See ordinance (Maury) (Sec. 240; Code).

Question 16. Have they been rigidly adhered to?

The department head says yes.

Question 17. What was the number of people enjoying free service last year? Question 18. Is the number increasing or decreasing?

No replies obtainable.

Question 19. What was the total amount of free service last year?

$138,043.56 (Charitable, $47,841.94; municipal, $90,201.62).

Question 20. Has any attempt been made to make confidential any of the features relating to free service, or has it generally been understood?

No reply.

Question 21. Is there any tendency to abuse the privilege of free service?

"Very often; people want water when not entitled to it."—Assessor's office.

Question 22. Has anything been done in case the privilege of free service has been found to be abused?

Free service taken away.

(Electric lighting.) No free service to individuals.

Richmond. Not ascertained.

City of Chicago—Water Department.

(All eight hours.)

Occupation.	*No.*	*Wages Per Day.*	*Wages Per Month.*
City Engineer	1	....	$416 66
Assistant Engineer	1	....	250 00
Superintendent	1	....	316 67
Assistant Superintendent	1	..	175 00
Chief Engineers (at stations)	8	....	208 33

Occupation.	*No.*	*Wages Per Day.*	*Wages Per Month.*
Mechanical Engineer	1	....	$375 00
Mechanical Engineers	26	....	135 00
Mechanical Engineer	1	....	125 00
Mechanical Engineers	9	....	100 00
Mechanical Engineer	1	....	83 25
Boiler Washers	7	....	90 00
Boiler Washer	1	....	80 00
Boiler Washers	5	....	75 00
Firemen	21	....	78 00
Firemen	57	....	75 00
Oilers	83	....	75 00
Oilers	9	....	65 00
Chief of Steam Fitters	1	....	135 00
Steam Fitters	8	$4 50	......
Steam Fitter	1	4 25	......
Steam Fitter	1	2 50	......
Steam Fitter's Helpers	6	2 50	......
Coal Passers	37	....	70 00
Well Tenders	4	....	65 00
Superintendent of Shops	1	....	150 00
Superintendent of Pipe Yards	1	....	135 00
Metal Chemists	2	....	166 66
Metal Chemist	1	....	125 00
Mason Inspectors	6	....	130 00
Masons	9	5 00	......
Mason	1	....	125 00
Brass Moulders	2	4 50	......
Meter Tester	1	4 50	......
Cement Tester	1	4 50	......
Valve Tester	1	3 20	......
Blacksmiths	6	4 50	......
Blacksmith's Helpers	2	2 70	......
Core-maker	1	4 00	......
Hydrant Builder	1	4 50	......
Pattern-makers	3	5 40	......
Machinists	40	4 50	......
Machinist's Helpers	5	3 20	......
Tinners	3	4 00	......
Tinner's Helpers	3	2 50	......
Sheet Metal Workers	3	4 00	......
Carpenters	60	4 40	......
Foreman	1	....	150 00
Foremen	2	....	135 00
Foremen	8	....	125 00
Foremen	2	....	75 00
Foremen	3	6 00	......
Foremen	12	5 00	......
Foreman	1	4 80	......
Foreman	1	3 50	......
Assistant Foreman	1	....	120 00
Assistant Foremen	26	....	112 50
Caulkers	97	3 00	......
Laborers	901	2 50	......
Laborers	20	....	65 00
Laborers	3	2 00	......
Tappers	21	....	100 00
Rodmen	15	....	83 33
Tunnel Superintendent	1	6 00	......
Tunnel Miners	2	3 60	......

Occupation.	*No.*	*Wages Per Day.*	*Wages Per Month.*
Tunnel Miner's Assistant	1	2 50	......
Diver	1	....	200 00
Diver's Helpers	2	....	100 00
Chief Clerk	1	....	166 66
Clerks	2	....	125 00
Clerks	2	....	99 00
Clerk	1	....	90 00
Clerks	9	....	83 33
Clerks	2	....	80 00
Clerks	7	....	75 00
Auditor and Bookkeeper	1	....	150 00
Draughtsman	1	....	125 00
Draughtsmen	2	....	112 50
Draughtsmen	4	....	100 00
Draughtsmen	7	....	90 00
Draughtsman	1	....	83 33
General Inspectors	4	....	125 00
Sub-inspectors	3	....	95 00
Inspectors	9	....	117 00
Inspector	1	....	100 00
Inspector	1	....	83 33
Inspectors	16	4 00	......
Janitors	8	....	65 00
Laundress and Janitress	1	....	20 00
Watchman	1	2 00	......
Watchman	1	....	65 00
Signal Man	1	3 00	......
Keepers	6	....	90 00
Assistant Keepers	6	....	75 50
Messenger	1	....	50 00
Chauffeur	1	....	83 33

Chicago Department of Electricity—Wages.

(All eight hours.)

No.	*Class.*	*Year.*	*Month.*	*Day.*
1	Chief Engineer	$2,500 00	......	....
1	Relieving Engineer	....	$120 00	....
8	Operating Engineers	....	120 00	....
24	Firemen, Oilers, Daymen	....	83 00	....
8	Water Tenders	....	78 00	....
5	Dynamo Tenders	....	93 00	....
2	Station Repairers	....	80 00	....
1	Armature Winder	....	......	$4 00
5	Coal Passers	....	65 00	....
1	Laborer	....	70 00	....
1	Laborer	....	65 00	....
2	Laborers	....	......	2 00
1	Brickmason	....	......	5 00
1	Chief Trimmer	....	125 00	....
1	Chief Trimmer's Assistant	....	83 33	....
56	Arc Lamp Trimmers	....	83 33	....
24	Arc Lamp Trimmers (6 mo. probation)	....	68 00	....
4	Arc Lamp Repairers	....	93 00	....
5	Circuit Repairers	....	110 00	....
3	Repairers	....	90 00	....
23	Linemen	....	......	3 40
5	Linemen	....	110 00	....
3	Linemen	....	90 00	....
8	Groundmen	....	......	2 00

Chicago Edison Co.—Hours.

	Per Day.	*Per Week.*	*Per Month.*
Station Labor—			
Engineers	8	..	232
Master Mechanic	8	..	232
Electrician	8	..	232
Switchboard Operators	8	..	232
Boiler Room Foremen	8	..	232
Dynamo Tenders and Wipers	8	..	232
Boiler Room Laborers	10	..	290
Firemen	8	..	232
Water Tenders	8	..	232
Engine Oilers	9	..	261
Pressure Boys	8	..	232
Janitors	10	..	290
Underground Men—			
Foremen	9	54	...
Inspectors	9	54	...
Jointers	9	54	...
Jointer's Helpers	9	54	...
Wagon Drivers	9	54	...
Laborers	9	54	...
Watchmen	14½	87	...
Emergency Men	9	54	...
Wiremen—			
Foremen	8	45	...
Foremen, Assistants	8	45	...
Wiremen	8	45	...
Wiremen, Helpers	8	45	...
Material Boys	8	45	...
Inspectors	8	..	194
Electric Signs—			
Sign Men	10	60	...
Sign Men, Helpers	10	60	...
Sign Repairers	8	48	...
Foremen	10	60	...
Shops—			
Carpenters	9	50	...
Machinists	9	50	...
Armature Winders	9	50	...
Switchboard Men	9	50	...
Arc Lamp Repairers	9	50	...
Foremen	9	50	...
Arc Lamps—			
Trimmers	8	..	216
Patrolmen	8	56	...
Repairmen	9	54	...
Lamp Delivery—			
Drivers	8	..	194
Lamp Testers	8	..	194
Supply Department—			
Automobile Drivers	8½	..	207
Order Fillers	8½	..	207
Customers' Repairs—			
Repair Men	9	..	237
Meter Department—			
Readers	8½	..	207
Testers	8½	..	207
Testers, Helpers	8½	..	207
Repairers	8½	..	207
Inspectors	8½	..	207

	Per Day.	*Per Week.*	*Per Month.*
Sub-station Labor—			
Operators	10	..	294
Operators, Apprentices	10	..	260
Battery Men	10	..	240
Collectors	8	..	194

Commonwealth Electric Co.—Hours.

	Per Day.	*Per Week.*	*Per Month.*
Station Labor—			
Engineers	8	..	232
Master Mechanic	8	..	232
Chief Electrician	8	..	232
Switchboard Operators	8	..	232
General Foremen	8	..	232
Dynamo Tenders	8	..	232
Boiler Room Laborers	10	..	290
Boiler Room Foremen	8	..	232
Firemen	8	..	232
Water Tender	8	..	232
Oilers	8	..	232
Engine Wipers	8	..	232
Oil Attendant	8	..	232
Mechanics	9	..	261
Janitors	10	..	290
Watchmen and Storekeepers	10	..	290
Miscellaneous	10	..	290
Overhead Men—			
Linemen	8	48	...
Ground Men	8	48	...
Combination	8	48	...
Stable Men	10	60	...
Sub-foremen	8	48	...
Wiring Department—			
Wiremen	8	45	...
Wiremen, Helpers	8	45	...
Foremen	8	45	...
Inspectors	8	..	194
Arc Lamp Department—			
Trimmers and Patrolmen	8	..	216
Repair Men	9	54	...
Sign Repairers	8	48	...
Lamp Changers	9	54	...
Supply Department—			
Automobile Drivers	8½	..	207
Order Fillers	8½	..	207
Incandescent Lamps—			
Lamp Room Boys	8	..	194
Customers' Repairs—			
Trouble Men	9	..	237
Meter Department—			
Readers	8½	..	207
Testers	8½	..	207
Inspectors	8½	..	207
Repair Men	8½	..	207
Sub-station—			
Operators	10	..	294
Operators, Apprentices	10	..	260
Battery Men	10	..	240
Pressure Boys	10	..	240
Collectors	8	..	194

Chicago Edison Company—Wages.

Wage Workers.	*Average Number for the Year.*	*Maximum Rate of Wages Paid per Hour, Day or Month.*	*Minimum Rate of Wages Paid per Hour, Day or Month.*	*Usual Wages Paid per Hour, Day or Month.*
Station	98			
Engineers	3	$125 00 per mo.	$95 00 per mo.	$105 00 per mo.
Master Mechanic	1	115 00 per mo.	....	....
Electricians	2	115 00 per mo.	90 00 per mo.	102 50 per mo.
Switchboard Operators	3	85 00 per mo.	85 00 per mo.	85 00 per mo.
Boiler Room Foremen	2	80 00 per mo.	80 00 per mo.	80 00 per mo.
Dynamo Tenders and Wipers	9	25 per hr.	18 per hr.	24 per hr.
Boiler Room Laborers	32	22½ per hr.	17½ per hr.	20 per hr.
Firemen	4	25 per hr.	25 per hr.	25 per hr.
Water Tenders	3	30 per hr.	30 per hr.	30 per hr.
Engine Oilers	15	32½ per hr.	25 per hr.	28 per hr.
Mechanics	17	37½ per hr.	20 per hr.	30 per hr.
Pressure Boys	2	20 per hr.	20 per hr.	20 per hr.
Janitors	5	20 per hr.	18 per hr.	19 per hr.
Underground Men	264			
Foremen	15	$80 00 per mo.	$0 28 per hr.	$75 00 per mo.
Inspectors	12	70 00 per mo.	22½ per hr.	65 00 per mo.
Jointers	20	70 00 per mo.	25 per hr.	65 00 per mo.
Jointers' Helpers	20	25 per hr.	22½ per hr.	23 per hr.
Wagon Drivers	12	22½ per hr.	22½ per hr.	22½ per hr.
Laborers	175	22½ per hr.	20 per hr.	21 per hr.
Watchmen	6	20 per hr.	20 per hr.	20 per hr.
Emergency Men	4	65 00 per mo.	65 00 per mo.	65 00 per mo.
Wiremen	325			
Foremen	8	$140 00 per mo.	$110 00 per mo.	$125 00 per mo.
Assistant Foremen	9	125 00 per mo.	37½ per hr.	100 00 per mo.
Wiremen	171	56¼ per hr.	31 per hr.	44 per hr.
Wiremen, Helpers	124	28 per hr.	19 per hr.	23½ per hr.
Material Boys	8	15 per hr.	12½ per hr.	14 per hr.
Inspectors	5	75 00 per mo.	50 00 per mo.	60 00 per mo.
Signs	31			
Sign Men	6	$0 31 per hr.	$0 31 per hr.	$0 32 per hr.
Sign Helpers	16	28 per hr.	19 per hr.	23½ per hr.
Sign Repairers	8	3 60 per day.	2 00 per day.	2 80 per day.
Foreman	1	100 00 per mo.	100 00 per mo.	100 00 per mo.

Wage Workers.	*Average Number for the Year.*	*Maximum Rate of Wages Paid per Hour, Day or Month.*	*Minimum Rate of Wages Paid per Hour, Day or Month.*	*Usual Wages Paid per Hour, Day or Month.*
Shops	76			
Carpenters	8	$0 37 per hr..	$0 30 per hr..	$0 34 per hr.
Machinists	11	44 per hr..	27 per hr..	35 per hr.
Armature Winders	36	35 per hr..	12 per hr..	30 per hr.
Switchboard Men	7	37 per hr..	25 per hr..	30 per hr.
Arc Lamp Repairers	10	33 per hr..	10 per hr..	30 per hr.
Foremen	4	100 00 per mo.	100 00 per mo.	100 00 per mo.
Arc Lamps	51			
Trimmers	27	$2 50 per day.	$1 44 per day.	$2 25 per day.
Patrolmen	16	2 60 per day.	2 00 per day.	2 50 per day.
Repairmen	8	3 60 per day.	1 98 per day.	2 60 per day.
Lamp Delivery	13			
Drivers	5	$55 00 per mo.	$55 00 per mo.	$55 00 per mo.
Lamp Testers	8	10 00 per wk.	6 00 per wk.	8 00 per wk.
Supply Department	23			
Automobile Drivers	4	$14 00 per wk.	$14 00 per wk.	$14 00 per wk.
Order Fillers	19	16 00 per wk.	9 00 per wk.	12 00 per wk.
Customers' Repairs—				
Repair Men	20	$90 00 per mo.	$60 00 per mo.	$80 00 per mo.
Meter Department	46			
Meter Readers	9	$50 00 per mo.	$35 00 per mo.	$40 00 per mo.
Testers	12	85 00 per mo.	50 00 per mo.	60 00 per mo.
Testers' Helpers	8	40 00 per mo.	....	....
Repair Men	11	85 00 per mo.	30 00 per mo.	44 00 per mo.
Meter Inspectors	6	70 00 per mo.	50 00 per mo.	60 00 per mo.
Sub-station Labor	75			
Operators	61	$90 00 per mo.	$68 00 per mo.	$75 00 per mo.
Operators' Apprentices	6	17½ per hr.	17½ per hr.	17½ per hr.
Battery Men	8	50 00 per mo.	37 70 per mo.	43 00 per mo.
	75			
Collectors	11	$110 00 per mo.	$60 00 per mo.	$80 00 per mo.
Grand total	1,033			

Commonwealth Electric Co.—Wages.

Wage Workers.	*Average Number for the Year.*	*Maximum Rate of Wages Paid per Hour, Day or Month.*	*Minimum Rate of Wages Paid per Hour, Day or Month.*	*Usual Wages Paid per Hour, Day or Month.*
Station	156			
Engineers	4	$125 00 per mo.	$100 00 per mo.	$125 00 per mo.
Master Mechanic	1	150 00 per mo.	150 00 per mo.	150 00 per mo.
Chief Electrician	1	175 00 per mo.	175 00 per mo.	175 00 per mo.
Switchboard Operators	12	75 00 per mo.	2 00 per day.	75 00 per mo.
General Foreman	1	85 00 per mo.	85 00 per mo.	85 00 per mo.
Dynamo Men	2	2 25 per day.	2 25 per day.	2 25 per day.
Boiler Room Laborers	45	25 per hr..	17½ per hr.	22½ per hr.
Boiler Room Foreman	1	2 50 per day.	2 50 per day.	2 50 per day.
Firemen	15	2 50 per day.	2 00 per day.	2 25 per day.
Water Tenders	4	2 80 per day.	2 80 per day.	2 80 per day.
Oilers	19	2 50 per day.	2 50 per day.	2 50 per day.
Engine Wipers	5	2 00 per day.	2 00 per day.	2 00 per day.
Oil Attendants	3	1 50 per day.	1 50 per day.	1 50 per day.
Mechanics	16	3 50 per day.	2 00 per day.	3 00 per day.
Janitors	9	20 per hr..	17½ per hr.	19 per hr.
Watchmen and Storekeepers	5	20 per hr..	20 per hr..	20 per hr.
Miscellaneous	13	17½ per hr.	17½ per hr.	17½ per hr.
Overhead Men	167			
Linemen	77	$0 37½ per hr.	$0 37½ per hr.	$0 37½ per hr.
Groundmen	40	25 per hr..	25 per hr..	25 per hr.
Combinationmen	13	2 75 per day.	2 50 per day.	2 65 per day.
Stablemen	6	2 00 per day.	2 00 per day.	2 00 per day.
Foremen	31	85 00 per mo.	85 00 per mo.	85 00 per mo.
Wiring Department	101			
Wiremen	50	$0 40 per hr..	$0 31 per hr..	$0 35 per hr.
Wiremen's Helpers	37	28 per hr..	19 per hr..	25 per hr.
Foremen	4	130 00 per mo.	100 00 per mo.	120 00 per mo.
Inspectors	10	85 00 per mo.	50 00 per mo.	70 00 per mo.

Wage Workers.	*Average Number for the Year.*	*Maximum Rate of Wages Paid per Hour, Day or Month.*	*Minimum Rate of Wages Paid per Hour, Day or Month.*	*Usual Wages Paid per Hour, Day or Month.*
Arc Lamp Department—				
Trimmers and Patrolmen	46	$2 60 per day.	$1 44 per day.	$2 25 per day.
Lamp Repairers	4	3 60 per day.	1 98 per day.	2 60 per day.
Sign Repairers	3	3 60 per day.	2 00 per day.	2 60 per day.
Lamp Changers	2	2 50 per day.	2 50 per day.	2 50 per day.
	55			
Supply Department—				
Automobile Drivers	3	$14 00 per wk.	$14 00 per wk.	$14 00 per wk.
Order Fillers	19	16 00 per wk.	9 00 per wk.	12 00 per wk.
	22			
Incandescent Lamps—				
Boys	3	$6 00 per wk.	$6 00 per wk.	$6 00 per wk.
Customers' Repairs—				
Repairers	26	$75 00 per mo.	$60 00 per mo.	$62 00 per mo.
Metermen—				
Meter Readers	12	$40 00 per mo.	$35 00 per mo.	$38 00 per mo.
Meter Testers	14	60 00 per mo.	40 00 per mo.	50 00 per mo.
Meter Inspectors	8	60 00 per mo.	40 00 per mo.	50 00 per mo.
Meter Repairers	5	45 00 per mo.	40 00 per mo.	42 00 per mo.
	39			
Sub-station—				
Operators	24	$90 00 per mo.	$55 00 per mo.	$75 00 per mo.
Operators' Apprentices	2	17½ per hr.	17½ per hr.	17½ per hr.
Batterymen	2	50 00 per mo.	37 70 per mo.	43 20 per mo.
Pressure Boys	6	46 00 per mo.	30 00 per mo.	36 40 per mo.
	34			
Collectors	15	$85 00 per mo.	$55 00 per mo.	$65 00 per mo.
Grand total	618			

Detroit Public Lighting Commission.—Wages and Salaries.

(All eight hours.)

	Rate Per Year.	Rate Per Day, and 7 Days Per Week.	Rate Per Day, and 6 Days Per Week.
Executive—			
1 Secretary	$1,650 00	....	....
1 General Superintendent	2,000 00	....	....
1 Assistant Superintendent	1,650 00	....	....
1 Bookkeeper and Clerk	1,050 00	....	....
1 Storekeeper	720 00	....	....
1 Superintendent's Clerk	720 00	....	....
1 Draughtsman	900 00	....	....
1 Janitor	......	....	$1 75
8			
Inspection Department—			
1 Inspector	$1,050 00	....	....
2 Inspectors, each	1,000 00	....	....
1 Permit Clerk	900 00	....	....
4			
Station—			
1 Chief Engineer	$1,320 00	....	....
2 First Engineers, each	......	$3 33	....
3 Second Engineers, each	......	2 50	....
8 Firemen, each	......	....	$2 00
2 Coal Passers, each	......	2 00	....
7 Oilers, each	......	1 90	....
1 Handy Man	780 00	....	....
1 Chief Electrician	1,080 00	....	....
2 Operating Electricians, each	......	2 75	....
3 Switchtenders, each	......	1 75	....
9 Laborers, each	......	....	1 75
39			
Lighting—			
1 Head Trimmer	$900 00	....	....
14 Trimmers, each	......	$2 25	....
3 Patrolmen, with horse and buggy, each	......	3 75	....
1 Patrolman, with horse and buggy	......	....	$3 75
1 Belle Isle Man	900 00	....	....
2 Sub Station Men, each	......	2 00	....
22			
Maintenance and Construction—			
1 Steamfitter	......	....	$3 25
1 Steamfitter's Helper	......	....	1 75
1 Latheman	......	....	3 00
2 Helpers, each	......	....	2 25
1 Blacksmith	......	....	2 75
1 Blacksmith's Helper	......	....	2 00
1 Foreman of Lamp Department	......	....	3 00
3 Helpers in Lamp Room, each	......	....	2 00
2 Helpers in Lamp Room, each	......	....	1 75

	Rate Per Year.	Rate Per Day, and 7 Days Per Week.	Rate Per Day, and 6 Days Per Week.
Maintenance and Construction—			
1 Helper in Lamp Room.........	......	....	$1 50
*1 Helper in Lamp Room..........	......	....	1 75
1 Painter	......	....	2 50
1 Helper	......	....	1 75
1 Carpenter	......	....	2 50
1 Line Foreman	......	....	3 25
2 Linemen, each	......	....	3 00
7 Linemen, each	......	....	2 75
1 Lineman	......	....	2 50
1 Line Helper	......	....	2 00
3 Line Helpers, each............	......	....	1 75
1 Groundman	......	....	1 75
1 Conduit Man	......	....	2 25
1 Conduit Helper	......	....	1 75

—
36

Total employes, 109.

*Temporary.

New Haven Water Company.

Occupation.	Average Number.	Maximum Wages Per Day.	Usual Wages Per Day.	Hours Per Week.
Engineers	5	$3 50	$3 50	56—60
Firemen	5	2 00	2 00	56—60
Inspectors	4	3 00	3 00	48
Meter Readers	2	3 00	3 00	60
Laborers	70	1 50	1 50	60
Others	16	2 00	2 00	..

Indianapolis Water Company.

Occupation.	Average Number.	Maximum Wages Per Week.	Minimum Wages Per Week.	Average Wages Per Week.	Hours Per Week.
Engineers	17	$20 83	$18 75	$17 94	84
Firemen	11	14 03	11 53	13 22	84
Coal Passers	7	.....	11 53	.....	84
Inspectors	7	14 71	9 00	11 51	60
Meter Readers	2	14 71	13 84	14 27	60
Street Department	11	20 10	9 60	13 40	..
Clerks	11	18 26	5 50	10 51	..
		Per Hour.	Per Hour.	Per Hour.	
Laborers	167	21½	15	16½	*60-†54

* Summer. † Winter.

Cleveland Water Works—All 8 Hours Per Day.

Occupation.	*Number.*	*Day.*	*Hour.*	*Wages.*
Engineer	1	....	..	$2,200 per year
Engineer	1	....	..	1,500 per year
Engineers	6	....	..	780 per year
Engineers	9	$2 80	..	....
Oilers	7	....	..	660 per year
Firemen	10	2 00	..	....
Coal Passers	10	....	$0 22	....
Inspector	1	....	42	....
Inspector	1	....	35	....
Inspector	1	....	30	....
Inspectors	13	....	27½	....
Meter Readers	27	2 25	..	....
Laborers	357	....	22	....
Calkers	81	....	25	....
Installers	66	....	27½	....
Foremen	34	....	37	....
Assistant Foremen	6	....	33	....
Tappers	3	....	..	780 per year
Assistant Tappers	4	2 00	..	....
Mason	1	....	60	....
Mason's Helper	1	....	30	....
Water Boys	4	....	10	....
Teamsters with Teams	6	....	43¾	....
Teamsters with Teams	2	....	50	....
Teamsters with Teams	24	....	37½	....
Keepers	6	....	..	720 per year
Keepers' Assistants	5	2 00	..	....
Watchmen	15	2 00	..	....
Watchman	1	....	..	660 per year
Janitors	4	....	..	660 per year
Machinists	4	2 80	..	....
Machinist	1	2 60	..	....
Machinist Helpers	8	2 00	..	....
Blacksmith	1	2 50	..	....
Blacksmith's Helper	1	....	22	....
Pipe Fitter	1	2 50	..	....
Pipe Fitter's Helper	1	1 75	..	....
Carpenters	4	....	45	....
Carpenters	2	2 50	..	....
Plumber	1	....	50	....
Water Tenders	3	2 25	..	....
Meter Tester	1	....	31	....
Store Keeper	1	....	..	960 per year
Store Keeper	1	....	..	720 per year
Messenger	1	....	..	45 per m'nth
Electrician	1	....	43¾	....
Night Turnoff Man	1	....	..	900 per year
Captain of Tug	1	....	33⅓	....

GENERAL HISTORY AND LEGISLATION

Massachusetts Electricity Works

(Schedule I)

By ALTON D. ADAMS and CHARLES F. PRICHARD

Municipalities—Chicopee, Danvers, Holyoke, Marblehead, North Attleboro, Peabody, Taunton, Westfield.

Companies—Abington and Rockland, the Electric Light and Power Company; Attleboro Steam and Electric Company; Beverly Gas and Electric Company; Fitchburg Gas and Electric Light Company; Gardner Electric Light Company; Northampton Electric Lighting Company; Salem Electric Lighting Company; Uxbridge and Northbridge Electric Company.

One schedule was prepared for each plant by Alton D. Adams, and also one prepared for each plant by C. F. Prichard, except that Mr. Prichard prepared no schedule for Uxbridge and Northbridge.

Where the answers of the two investigators are identical, they are given without designations; where the answers differ, they are both given, and signed by the respective initials of the authors.—J. H. Gray.

A—HISTORICAL AND GENERAL.

A 1. Date when this establishment began to sell electricity for light.

Municipalities.

Chicopee. A. On May 28, 1896, the city of Chicopee began to operate an electric plant for public lighting, and on July 7, 1896, the plant started a load of incandescent lamps in commercial service (1896 Report, 50). Under a decree of the Court Chicopee received a transfer of a part of the private electric plant on January 1, 1896, but the private corporation continued by agreement to operate the existing electric plant until the city started the new plant on May 28, 1896 (1896 Report, 50). The old electric station and foundations were not sold to the city, because they were neither owned nor held on written lease by the private company (1895 Report 52).

P. May 28, 1896.

Danvers. A. Danvers began to operate an electric plant for street lighting on January 2, 1889, and to supply light to private consumers about December, 1896 (1892 Report 21, 1896 Report 51). The word " report " is used in all these schedules to indicate the annual reports of the Gas and Electric Light Commissioners. The figures before the word "report" indicate the year, ending June 30, for which the report is made, and the figures following the word "report" indicate the page therein. There was no direct legislative authority for the erection of the electric plant by Danvers in 1889, but chapter 378 of the Acts of 1891 granted such authority to the town by a special act, and also empowered the town to supply light and power to its inhabitants. Meantime, in 1889, the Gas and Electric Light Commissioners gave the gas company in Danvers authority to engage in electric lighting, but the gas company has not put in an electric plant. In the year just named the vote of Danvers in town meeting was 194 to 7 in favor of an act that would give the town authority to sell electric light (1889 Report 89).

P. Street, 1889; commercial, 1896.

Holyoke. A. In 1888 the gas commissioners authorized the Holyoke Water Power Company to acquire the plant of the Holyoke Electric Light and Power Company, and the Holyoke Water Power Company was already operating the gas plant in Holyoke (1888 Report 76). On December 15, 1902, the city of Holyoke accepted the transfer of the gas and electric plants of the Holyoke Water Power Company under a decree of the court that enforced the right of that company to sell its plant (1902 Report 5). Under the decree of the court the city of Holyoke accepted the electric plant of the Holyoke Water Power Company at a valuation of $329,870, together with the obligation to pay a perpetual water rent of $18,000 yearly (1902 Report 80; Record of Holyoke Water Power Co. *v.* Holyoke, Vol. XX., page 173).

P. 1902.

Marblehead. A. Marblehead began to operate its municipal electric plant for both street and commercial lighting about January, 1895 (1894 Report 60).

P. February 15, 1895.

North Attleboro. A. Street lighting began February 22, and private lighting March 1, 1894, and on the following June 30 there were 49 private consumers (1894 Report 63). Early in 1894 the plant of the North Attleboro Steam and Electric Company was damaged by fire and ceased to operate. The bondholders foreclosed their mortgage, reconstructed the plant, and began to operate it (1894 Report 46). On October 15, 1894, this plant came under the control of a trustee in the interest of the Attleboro Steam and Electric Company, a corporation subsequently formed for the purpose of operating it (1894 Report 46, 1895 Report 4, 1896 Report 30). Stock to the amount of $65,000 appears to have been issued by this last named company for the reconstructed plant, subject to a $10,000 mortgage (1894 Report 46). After North Attleboro passed the necessary votes to construct a municipal electric plant in March, 1893, the North Attleboro Steam and Electric Company filed a schedule of its property with the town clerk, but the private corporation never enforced its right to sell its plant to the town, and the town built a new plant (1893 Report 49).

P. March, 1894.

Peabody. A. On September 27, 1892, the town plant was started for street lighting, and on November 10, 1893, the business of commercial lighting was begun (1892 Report 25, 1893 Report 51).

P. 1892 for street lighting; 1894 for commercial lighting.

Taunton. A. On July 1, 1897, the Taunton Electric Light Company sold its plant to the city of Taunton. Prior to this time the city had taken the necessary votes to establish an electric plant, and the electric company had commenced proceedings to force the purchase of its plant by the city. By decree of the court Taunton paid $125,000 for the electric plant of the company (1897 Report 52).

P. July 1, 1897.

Westfield. A. By contract dated September 16, 1887, the Westfield Gas Light Company agreed to pay $30,500 for the real and personal property and franchises of the Westfield Electric Light Company, contingent upon the consent of the gas commissioners to electric lighting by the gas company, and this consent was granted September 23, 1887 (1887 Report 68, also report of hearing before the gas and electric light commissioners). On June 1, 1899, the Westfield Gas Light Company and the town of Westfield reached an agreement in the litigation instituted by the gas company to compel the town to purchase the gas and electric plants of the company, and the town took these plants and paid about $150,000 for them. The gas company then went out of business (1899 Report 4). When the gas company bought the electric plant and franchise in 1887 the plant included two arc dynamos of 30 lamp capacity each, and one 50 lamp arc dynamo. The capital stock of the electric company was $25,000.

P. June 1, 1899.

Companies.

P. Data relating to companies is obtained from public records and from inspection of the properties.

Abington and Rockland. A. Probably in 1891. P. December 24, 1891.

Attleboro. A. In January, 1895, the Attleboro Steam and Electric Company took possession of the electric plant formerly belonging to the North Attleboro Steam and Electric Company and which had been held by a trustee for the former company since October 15, 1894. Early in 1894 the plant of the North Attleboro Steam and Electric Company was damaged by fire and soon after passed by foreclosure of mortgage into the hands of the bondholders. On October 26, 1894, the Attleboro Steam and Electric Company was incorporated to purchase the electric plant. The Attleboro Steam and Electric Company paid $64,700 for the plant, subject to a mortgage of $10,000. An appraisal on behalf of the State Gas and Electric Light Commissioners indicated that the value of the plant was greater than $75,000 (1896 Report 30, also record of hearing before the gas and electric light commissioners on issue of bonds).

P. 1892. Reorganization, 1894, of the North Attleboro Steam and Electric Company as a result of a disastrous fire. The assets of the former company were bought and property operated by a trustee until the new company was organized and authorized to purchase property by the gas and electric light commission as required by law. As per tenth annual report of the Board of Gas and Electric Light Commissioners, $65,000 of stock was paid for all assets of the above, subject to a mortgage of $10,000.

Beverly. A. (As Mr. Charles F. Prichard is one of the directors of the Beverly Company, only those answers that could be obtained from the public records and from inspection of the property are given for the Beverly plant in any of the schedules.)

A. During the year 1887. On June 15, 1888, the Massachusetts Gas and Electric Light Commissioners granted the petition of the Beverly Gas Light Company for the right to engage in electric lighting. The gas company had previously agreed to purchase the existing electric plant. The gas company bought the existing electric plant, and the Beverly Electric Light Company went out of the business. On June 30, 1888, the capital of the electric company was $8,000, and its unpaid bills amounted to $3,275. On June 30, 1888, the stock of the gas company was $51,800, and the debts $1,260.81; but on the corresponding date of 1889 the stock was $61,800, and the debts were $6,365.13 (1887 Report 59, 1888 Report 72 and 76, 1888 Report 93, 1888 Report 151, 1899 Report 121).

P. 1887.

Fitchburg. A. Organized 1883. The Fitchburg Gas Company was authorized to purchase the electric plant of the Wachusett Electric Light Company and to engage in electric lighting by the board of gas commissioners on November 26, 1889, after a contract between these corporations for the transfer of the electric plant. The electric light company had a capital stock of $100,000, and went out of business after this plant was sold to the gas company. During the year of the transfer the capital of the gas company was increased $40,000 and it contracted a debt of $68,000—probably in part for new electric and power equipment (1887 Report 61, 1889 Report 87, 1889 Report 138, 1890 Report 145).

P. 1889. A corporation originally operated by Wachusett Electric Light Company commencing in 1883, which was bought out by the present company by purchasing the stock of the Wachusett company.

Gardner. A. During the year ending June 30, 1889. The Gardner Electric Light Company, a corporation, succeeded the Gardner Electric Company during the year ending June 30, 1892 (1891 Report 153, 1892 Report 169).

P. October 1, 1891. A corporation (November 3, 1891) originally the Gardner Electric Company from 1888 to 1891. The Gardner Electric Light Company succeeded the above company in 1891, and was capitalized at $30,000, the stockholders paying into the treasury $150 per share for their stock.

Northampton. A. During the first half of 1886. A corporation at the beginning. The grant to use the streets appears to have been made to the Thomson-Houston Electric Company, a manufacturer of electric machinery, and after the plant was erected the present operating company was formed to take it over late in 1886. Parties representing the Schuyler company, also a manufacturer, erected a plant early in 1886, but it is understood that the Schuyler company was induced to withdraw after a few months, and its plant was removed.

P. January, 1887. A private corporation from the beginning. No change.

Salem. A. Before June 1, 1882. A private corporation from the beginning. No change in ownership.

P. 1882. Private corporation from the beginning, with no change in ownership.

Uxbridge and Northbridge. A. Year of June 30, 1890. A private corporation from the beginning, with no change in ownership (1890 Report 204).

A 2. If it is a municipal plant, was current being supplied by private company when city began operation?
A 3. The character of original organization, whether individual, firm, corporation, municipal or other form.
A 4. Character of present organization, whether individual, firm, corporation, municipal or other form.
A 5. Date and character of all changes in ownership since origin.
A 6. State method of making each change.
A 7. State terms of each arrangement.

Municipalities.

Chicopee. A. The city purchased plant which had been operated by a corporation. Since 1887. Municipal operation began May 28, 1896, for public lighting and on July 7, 1896, for commercial service. The plant has undergone but one change, from private to public ownership. This was by votes of the city council November 23, 1891, and December 12, 1892. The city paid $27,000 under a decree of the court for the part of the old electric plant purchased (1891 Report 23, 1892 Report 20, 1896 Report 50).

P. One change, from private to public ownership, by which the city paid $27,000 for the property of the company under votes of the city council of November 23, 1891, and December 12, 1892.

Danvers. A. The plant has been a public one from the beginning, as explained under A 1.

P. No change in ownership from the beginning.

Holyoke. A. But one change in ownership from the beginning as explained in A 1.

P. But one change in ownership, from private to present municipal ownership. The city purchased the property of the company under the acts of 1891, and amendments thereto, for the net sum of $802,766.93.

Marblehead. A. No change in ownership. (See A 1.)

P. Plant originally established by municipality; no change in ownership.

North Attleboro. A. Answered under A 1. P. Municipal plant from the beginning.

Peabody. A. Municipal from the beginning.

P. Present plant established by municipality; part of the town previously served by private company—the Salem Electric Lighting Company.

Taunton. A. A municipal plant at present, purchased from private companies. (See A 1.)

P. A municipal plant purchased by the city for $125,000 cash under the municipal ownership act of 1891, after enabling votes had been passed.

Westfield. A. The municipality purchased the private plant. (See A 1.)

P. The municipality purchased in 1899 the gas and electric property of the private corporation under the Municipal Ownership Act of 1891 and amendments thereto.

Companies.

There has been no change in the form of ownership of any one of the eight companies investigated, except that the Beverly plant was first established by an association instead of a corporation. (See A 1).

A 8. State fully reasons for each change in ownership.

Municipalities.

Chicopee. A. The electric company probably wished to avoid competition with a municipal plant, and hoped to get a large price for its property.

P. Street lighting only was operated by the Chicopee Gas Company, and there was a public demand for commercial electric lighting which the gas company did not provide, and therefore municipal ownership was instituted. The gas company was not willing to develop commercial or residential lighting, as it would compete with its gas business.

Danvers. ————

Holyoke. A. The probable motive of the Holyoke Water Power Company in forcing the city to purchase its gas and electric plants was to avoid municipal competition and to obtain a large price for the properties. In its votes the city expressed the intent to establish an electric plant, but suit of the water power company forced the city to purchase also the gas plant.

P. The business was being carried on by the Holyoke Water Power Company, whose other interests, namely, the water power privileges of the canals of Holyoke, were so great they did not pay a great deal of attention to the gas and electric business and the natural demand for extension and on this account and also to secure the supposed benefits of municipal ownership, the plants were taken over.

Marblehead. ————

North Attleboro. A. The private corporation was apparently bankrupt at the time the mortgage against the plant was foreclosed. No change as to the municipal plant. P. ————

Peabody. ————

Taunton. A. Before the city bought the plant the electric company charged 5 cents per arc lamp hour, or 15 1/10 cents per K. W. H. for street lighting, and the desire for a lower rate moved the city to obtain a municipal plant (1896 Report 158). A desire to avoid competition with the municipal electric plant, and the opportunity to obtain a high price for a much worn and depreciated electric plant, appear to have been among the important causes that induced the company to sell its plant.

P. The reason for the change was a desire for municipal ownership, as public sentiment was in favor of it, and a belief that lower rates would result.

Westfield. A. A desire to do away with competition appears to have been the main motive for the combination of 1887. Both fear of municipal competition, and a desire to obtain a large price for its property probably moved the gas company to force the purchase of its plants by the town in 1899.

P. The city desired to engage in the business, and therefore passed the enabling votes.

Companies.

Abington and Rockland. ————

Attleboro. A. As the old corporation was insolvent, it was obviously convenient to form a new corporation to own and operate the plant.

P. Disastrous fire destroyed the entire property of the company and practically bankrupted the old concern, the bondholders taking possession of the property of the company.

Beverly. A. The electric company was hardly paying expenses, and the desire of both the gas and electric interests seems to have been to avoid further competition.

P. ————.

Fitchburg. A. The desire of the gas company to avoid the electric competition, and the fact that the electric company was not doing a paying business.

P. To consolidate the electric with the gas business.

Gardner. A. ———— P. The reason for reorganizing was because the original company had a large indebtedness in excess of the then value of the plant.

Northampton. A. It was the policy of the Thomson-Houston Company to form local companies to operate electric plants that it had installed in the early days of electric lighting. The Schuyler plant was evidently suppressed to avoid competition.

P. ————

Salem. ————

Uxbridge and *Northbridge.* ————

A 9. Has there ever been municipal ownership and private operation of plant?

All changes in the form of ownership and operation have been fully explained under Question A 1 to A 8.

A 10. Is the general sentiment favorable or unfavorable to the present system of ownership and operation?

Municipalities.

Chicopee. A. Generally favorable. An investigation is under way with view to better financial results from the plant.

P. Favorable.

Danvers. Favorable. No proposition to sell the plant has ever been considered.

P. Citizens appear favorable, although an investigating committee of five is now working on the matter.

Holyoke, Marblehead, Taunton, Westfield. Favorable.

North Attleboro. A. Favorable, and large extensions to be made.

P. Favorable as municipal ownership is now adopted.

Peabody. A. Favorable. Some desire for an investigation of the plant, but there seems to be little or no probability that its use will be discontinued.

P. Generally favorable, but an investigating committee is looking into the matter.

Companies.

Mr. Adams answers with a dash in each case.

Mr. Prichard answers "Favorable" for all except Attleboro and Northampton, for which he answers "Very favorable."

A 11. What is the attitude of the press?

Mr. Adams answers "Favorable" for Danvers and Marblehead; "No local press" for Peabody, and with a dash in all other cases.

Mr. Prichard answers "Favorable" in each case except that for Peabody he answers "Friendly."

A 12. State current objections to present system.

Municipalities.

Chicopee. A. Some lack of modern equipment and of the more efficient types of equipment for the work of the plant.

P. Criticism of the amount of net earnings from operation. A committee of seven aldermen and the mayor is appointed by the Board of Aldermen to investigate the operation of the plant. They will report shortly.

Danvers. A. The main objection appears to be that the town has not thus far erected a plant of the most modern and efficient type, and that the capacity is too small.

P. Plant inefficient.

Holyoke. A. The city was forced to take the plant at a greatly inflated valuation, and the depreciation charge fixed by statute on this valuation operates against reductions in rates.

P. No apparent objections.

Marblehead. A. Lack of the most modern and efficient equipment and of ample capacity.

P. No day service or electric power service.

North Attleboro. A. Lack of capacity and of the most modern and efficient equipment, but contracts have been closed for a large increase of capacity with efficient apparatus.

P. Object to raising (money) by taxation for investing in extensions and improvements.

Peabody. A. Lack of capacity and of the most modern and efficient equipment.

P. The raising of new money each year for extensions to meet the demands of the business.

Taunton. A. The electric plant is in a prosperous condition, but the differences between rates to small and those to large consumers are too great. P. None.

Westfield. A. Lack of ample capacity and of the most modern and efficient equipment. P. None.

Companies.

Abington and *Rockland.* A. Doubtful whether rates are entirely fair as between the users of light and power.

P. Nothing tangible.

Attleboro. A. Too much difference between the rates to large and those to small consumers. P. None.

Beverly. A. Some rate discrimination in favor of large consumers and particularly in the matter of electric power. P. None.

Fitchburg. A. The high rates to small consumers and the discrimination in rates between large and small consumers. P. None.

Gardner. A. ————. P. None.

Northampton. A. Difference between rates to large and small consumers too great. P. None.

Salem. A. Discrimination in favor of large consumers. P. None.

Uxbridge and *Northbridge.* A. Very doubtful if the differences in rates to different consumers and to other companies are fair.

A 13. Do the citizens take an active interest in the management of the plant?

Municipalities.

Chicopee. A. Yes, as to rates and financial results. P. Yes.

Danvers. A. Much interest is taken in the financial results of operation. P. Considerable.

Holyoke. A. Yes, in rates for service and in financial results. P. Not in the management, but they do in the welfare.

Marblehead. A. Most interest attaches to the cost of service and to the financial results of operation. P. Indifferent.

North Attleboro. A. Yes, as to rates and financial results. P. Yes.

Peabody. A. Yes, as to rates for service and financial results.

P. No.

Taunton. A. Yes, as to rates and financial results.

P. No, but they do in the welfare of the plant.

Westfield. A. Yes, as to rates for service and financial results.

P. Generally interested.

Companies.

Mr. Adams indicates in each case that the interest is merely "as to rates and quality of service."

Mr. Prichard answers "No" for all companies.

A 14. Have there ever been competing electric lighting companies in the city?

Both investigators answer "No" in each case except:

Municipalities.

Holyoke. A. If any competition of electric lighting companies ever existed, it was before 1887, but the Holyoke Water Power Company now has a plant for the distribution of electric power in not less than 100 H. P. units.

North Attleboro. A. There appears to have been some competition between the private and municipal plants after the latter was built, but later the private plant confined its service to Attleboro. If there was competition it probably applied to only a small part of the town.

Peabody. A. In a limited area the Salem Electric Lighting Company competes with the municipal plant.

P. Only in a small way which still continues, but not as an aggressive competitor.

Taunton. A. The Taunton Electric Lighting Company was organized in 1882, but it does not appear from the records of the gas commissioners that any other electric lighting company has operated there.

Companies.

Attleboro. A. On February 22, 1894, the town of North Attleboro began to operate an electric plant and the private electric plant withdrew its service from the town.

Northampton. A. Only as indicated above. (A 1 to A 6. Gray.)

A 15. Are there competing companies now?

Both investigators answer "No" in the case of all plants, public and private except as follows:

Holyoke. A. The municipal electric plant competes with the Holyoke Water Power Company in the sale of electric power.

Peabody. See A 14.

A 16. If the private companies have consolidated, give date and methods briefly.

Municipalities.

Chicopee. A. and P. ————

Danvers. A. There have been no private electric companies. P. None.

Holyoke. A. In 1888 after the permission of the Gas and Electric Light Commissioners had been obtained, the Holyoke Water Power Company purchased the plant and franchises of the Holyoke Electric Light and Power Company.

P. No consolidation.

Marblehead, North Attleboro, Peabody, Taunton. A. and P. No consolidation.

Westfield. See A 1.

Companies.

Abington and Rockland, Attleboro. A. ————

P. None.

Beverly. A. Only gas and electric companies, as explained in A 1. P. None.

Fitchburg. A. Only gas and electric companies, as explained in A 1.

P. Bought out electric lighting company about 1888. See A 1.

Gardner. A. ———— P. No.

Northampton. A. It is probable that the early Schuyler plant was removed upon the payment of some consideration by the Thomson-Houston interests. P. No.

Salem. No consolidations.

Uxbridge and *Northbridge.* ————

A 17. If the present company is a subsidiary or a leased company,
- (*a*) Give name and address of controlling company; or
- (*b*) Lessor, and
- (*c*) Date such control began, or
- (*d*) Date of lease.

Municipalities.

This question does not apply to municipalities.

Companies.

Abington and Rockland. A. The company is now understood to be under the control of the Stone and Webster Company of Boston.

Attleboro, Beverly and *Gardner.* A. and P. ————

Fitchburg. A. No such control. P. ————

Northampton. A. Was not a subsidiary company on June 30, 1906, but has since become so.

P. Not a subsidiary or controlled company.

Salem. A. Not a subsidiary company. P. ————

Uxbridge and *Northbridge.* A. ————

A 18. Population of city at last national census.

A 19. Estimated population January 1, 1906.

A 20. Source of such estimate.

Municipalities.

Mr. Adams' answers to questions 19 and 20 are based on the State Census of 1905; and Mr. Prichard's on "Local Authority."

		A 18	A 19	A 20
Chicopee	(A.)	19,167	20,191	....
	(P.)	21,000	21,000	....
Danvers	(A.)	8,542	9,063	....
	(P.)	9,063	9,500	....
Holyoke	(A.)	45,712	49,934	....
	(P.)	49,934	52,000	....
Marblehead ..	(A.)	7,582	7,209	....
	(P.)	7,209	7,500	....
N. Attleboro..	(A.)	7,253	7,878	....
	(P.)	7,800	9,000	....
Peabody	(A.)	11,523	13,098	....
	(P.)	13,098	14,000	....
		(State Census)		
Taunton	(A.)	31,036	30,967	....
	(P.)	30,967	32,000	....
Westfield	(A.)	12,310	13,611	....
	(P.)	13,300	14,000	....

Companies.

		A 18		A 19		A 20
Abington and	(A.)	4,489	(Fed. Cen.)	5,081	(State Cen. '05)	
Rockland ...	(A.)	5,327	(Fed. Cen.)	6,287	(State Cen. '05)	
		9,816		11,368		
Abington and Rockland ...	(P.)	11,368		11,500		Local Authority
Attleboro	(A.)	11,335		12,702		12,702 (S. C. 1905)*
	(P.)	12,702		15,000		Local Authority
Beverly	(A.)	13,884		......		15,223 (S. C. 1905)*
	(P.)	15,223		17,000		Local Authority
Fitchburg ...	(A.)	31,531		......		33,021 (S. C. 1905)*
	(P.)	33,021		35,000		Local Authority
Gardner	(A.)	10,813		......		12,012 (S. C. 1905)*
	(P.)	12,012		12,012		Local Authority
Northampton	(A.)	18,643		......		19,957 (S. C. 1905)*
	(P.)	19,957		20,000		Local Authority
Salem	(A.)	35,956		......		37,627 (S. C. 1905)*
	(P.)	37,627		38,000		Local Authority
Uxbridge ...	(A.)	3,589		......		3,881
Northbridge .	(A.)	7,036		......		7,400
		10,625				11,281 (State Census 1905)

---

* S. C.—State Census

A 21. Are there gas works in the city which compete with electricity?

Municipalities.

"Yes" for all, except:

Holyoke. A. The city has a gas and an electric plant and there is also the electric plant of the Holyoke Water Power Company. One electric plant is thus private. The Holyoke Water Power Company has the right to distribute electric energy for power only in units of not less than 100 H. P. P. Yes.

Peabody. A. Yes.

P. Not in city, but gas competes from Salem company.

Westfield. A. The town owns the only gas and electric systems within its limits. P. No.

Companies.

Abington and *Rockland.* No.

Attleboro. Yes.

Beverly. Gas and electric works owned by the same corporation.

Fitchburg. Gas and electric plants owned by the same corporation.

Gardner, Northampton and *Salem.* Yes.

Uxbridge and *Northbridge.* A. No.

A 22. Were these public or private?

Municipalities.

Both answer "Private" in each case except:

Holyoke. A. One electric plant is thus private.

P. Public.

Westfield. A. Municipal. P. Public.

Companies.

Both answer "Private" in each case, except that Abington and Rockland, and Uxbridge and Northbridge are left unanswered.

A 23. If private, were they owned or controlled by the same persons controlling electric works?

Municipalities.

Chicopee. A. No. P. Gas plant owned by private company.

Danvers. No.

Holyoke. A. The gas plant is owned by the city.

P. ———

Marblehead. A. No. P. Gas plant owned by private company.

North Attleboro and *Peabody.* No.

Taunton. A. No. P. No, by others.

Westfield. ———

Companies.

Abington and *Rockland.* ———

Attleboro. A. ——— P. No.

Beverly and *Fitchburg.* Yes.

Gardner and *Northampton.* A. ———— P. No.
Salem. No.
Uxbridge and *Northbridge.* A. ————

B—SUPERVISION OF MUNICIPALITIES.

The questions under Schedule B do not apply to private plants.

P. For answer to Schedule B, see also Massachusetts public statutes. The questions relating to the supervision of municipalities, supervision of private companies and franchises of private companies are not answered in detail. These matters are regulated by the laws of Massachusetts, consequently one set of answers will apply in all the cases. It was, therefore, agreed there could be no question as to the law and that Mr. Alton D. Adams, who has had a legal training, should answer these questions in some one case and this answer should apply in all the cases.

B 1. Does municipality have power—
- (a) To construct its own electric plant when there is no private competing plant? Yes.
- (b) To construct its own electric plant without purchasing existing private plants.? A. Not if the company desires to sell the plant. P. No.
- (c) To condemn private plants under the right of eminent domain? No.
- (d) To purchase private plant? A. Only when the company desires to sell. P. Yes.
- (e) To operate the plant when constructed or acquired? Yes.
- (f) To condemn property for additions to plant? A. Doubtful. P. No.

B 2. How was the power conferred, by—
- (a) General law applicable to all cities of the state? Yes.
- (b) General law applicable to all cities in a class? No.
- (c) Special act applicable to this city alone? No.
- (d) Administrative order? ————
- (e) Other methods? ————

B 3. Does the city have power for the construction or acquisition of electric lighting works to raise money—
- (a) By taxation? A. Yes. (b) By sale of bonds? A. Yes. (c) By other methods? (State what.) A. Notes or scrip.

B 4, 5, 7. ————

B 6. What is the limitation upon the city's power to incur debt for municipal electric lighting works? A. In cities 2½ per cent. and in towns 5 per cent. of the value of the property within its limits, according to the last preceding state valuation, is the limit to the bonds that may be issued for gas and electric plants.

B 8. State fully, step by step, the procedure which *must* be followed and the requirements which *must* be met before the city may construct or acquire a plant. Also source of each provision, whether state constitution, statute or ordinance. Note particularly requirements as to initiation of proposal, special action by city authorities before its adoption, mayoralty veto, referendum, publicity, making of appropriations, bond issues and approval of scheme by courts or state authorities.

Schedule B—Supervision of Municipalities—questions 8 to 40, inclusive, Mr. Adams submits the subsequent general report and does not answer the separate questions in the different schedules.

Mr. Prichard makes the reference already given to the General Statutes of Massachusetts, and leaves the schedules blank except that under B 34 for the private companies Abington and Rockland and Attleboro he states that the board of gas and electric light commissioners have supervision, and under B 35 (What have been the effects of this supervision?), except for Chicopee "A source of annoyance to the department," and North Attleboro, "————," he answers by the word "beneficial"; and when under B 36 (Does the municipality make regular reports to state boards or commissions as to results of operation?) he answers by "Yes," and under B 37 (Is there any authority not connected with the municipality itself which tests the current and character of the service?) he answers by "No," and B 38 (Are the results of such examination public?) he answers "No."

GENERAL REPORT BY ALTON D. ADAMS.

Section B, 8-40.

Purchase, construction and operation of all municipal gas and electric plants in Massachusetts have been governed by the general statutes here presented, except that the *Danvers* plant was built before the act of 1891, and a special act giving validity to the doings of the town in the matter was subsequently passed (Chapter 378, Acts of 1891). This act is not the same on all points as to the construction and operation of the Danvers plant as is the general statute.

B 8. Chapter 370 of the acts of 1891 provided that no city might exercise the authority to construct or purchase a municipal plant until a vote to that effect had been passed by two-thirds of each branch of the city council and received the approval of the mayor in each of two consecutive municipal years, and had thereafter been ratified by a majority of the voters present and voting thereon at an annual municipal election. When the vote of the city council failed to secure ratification at the municipal election, no similar vote could be submitted for ratification until after five years.

Section seven of chapter 454 of the acts of 1893 provided for the submission of the vote of the city council to the voters at an annual municipal election, without the approval of the mayor, provided that the council passed its vote, in the usual manner, over the veto of the mayor, or the mayor failed to act in the matter. By the last named section the period that must expire between the failure of the voters at the municipal election to ratify the vote of the city council and the submission of a similar vote for ratification was reduced to three years.

In 1894, chapter 432 of that year reduced the period between the failure to ratify the vote of a city council at an annual municipal election and the time when a similar vote may be submitted for ratification to one year. Chapter 448 of the year last named provided that the vote of the city council in favor of a municipal plant might be ratified by a majority of the voters present and voting at a special municipal election.

Before a town may acquire a municipal electric plant under chapter 370 of 1891, a vote that it is expedient to obtain such a plant must have been passed by not less than two-thirds of the voters present and voting at each of the two legal town meetings duly called for the purpose. The second of these meetings must be held at an interval of not less than two nor more than thirteen months after the first, and the votes of these meetings must be taken by written or printed ballot and by use of the check list. No change in these requirements relative to the votes of towns for municipal plants, as laid down in section 3 of chapter 370 of 1891, has since been made. If the vote for a municipal plant fails to pass at the second of the two town meetings, no similar vote may be passed before the expiration of two years.

(See reply to question B 19 as to bonds.)

B 9. A city or town is not obliged to pay taxes or fees in regard to its electric plant to any governmental authority.

B 10. If a city or town decides by the votes named in the reply to question B 8 to establish an electric plant, and any person or corporation is engaged in the manufacture or distribution of electricity for light in the city or town at the time of the first vote, the city or town must purchase the plant of such person or corporation within its limits, if the person or corporation elects to sell, under section 12 of chapter 370 of the acts of 1891.

The city or town must purchase both a gas and an electric plant, if it decides to establish either an electric plant or a gas plant, and a single corporation owns both a gas and an electric plant within the city or town, and elects to sell. While the obligation of the city or town is to purchase only the plants within its limits, damages must be paid by the city or town for the severance of any gas or electric distributing plant that lies outside of its limits, and is operated from the electric generating plant or main gas works that the city or town is obliged to purchase, under the above named section.

If the electric or gas and electric plants within its limits that the city or town is obliged to purchase are used only for distribution from a main gas works or electric generating station outside the limits of the city or town, no damages are to be paid for the severance of the distributing equipments from the generating and manufacturing plants. The price to be paid by the city or town for either a manufacturing or distributing plant was fixed by the above section at its fair market value for the purpose of its use, but no portion of the plant was to be estimated at less than its fair market value for any other purpose. In this value the actual earnings of the purchased plant at the time of the final vote of the city or town to establish a plant were included as an element, but the value was not to be enhanced by future earning capacity or good will or exclusive privileges derived from rights in the public streets.

Section 5 of chapter 454 of 1893 amended the above section 12 of chapter 370 of 1891 in several particulars. The provision of the earlier chapter that included the actual earnings of a plant at the time of the final vote of the city or town as an element of the value of the plant was stricken out. Another amendment made the liability of a city or town to pay damages for the severance of distributing apparatus outside of its limits from a main gas plant or electric generating station within its area depend upon the refusal or neglect of the city or town to purchase such outlying plant. A mistake in the wording of the last named amendment was corrected by chapter 538 of the acts of 1894. Section 5 of chapter 454 of 1893 further amended the act of 1891 by providing that no city or town shall be obliged to buy any property added to the plant unnecessarily after the passage of its first vote to establish such a plant, nor any property that is not suitable for the ordinary business of the vendor that the city or town may assume.

By chapter 255 of 1903, locations or similar rights derived from private persons were taken from the list of items that were to be included in estimating the fair market value of a plant that a city or town is obliged to purchase.

By section 1 of chapter 454 of 1893, a city or town that comes under the above obligation to buy a main gas works or electric generating station within its limits is given the right at its election to buy any distributing apparatus that forms a part of such plants in the adjoining cities or towns. This right arises only where no other private company is engaged in the same sort of lighting business in the adjoining city or town, and is subject to the provisions that govern the purchase of the main plant.

Section 3 of the chapter last named requires the owner of a gas or electric plant in a city or town that has passed its first vote to establish such a plant to file a schedule with the clerk of the city or town on request, if such owner desires to enforce the obligation of the city or town to purchase the plant. This schedule must contain a detailed statement of the property that the owner desires to sell to the city or town, with the proposed terms of sale, and must be filed within thirty days after request authorized by the council and made by the mayor in a city, or made by the selectmen in a town.

If any of the property that the city or town would have the right to purchase, after its owner had elected to enforce the obligation of the city or town, is located in an adjoining city or town, a separate schedule of such property must be filed as above. After the filing of these schedules, the property covered by them and other property used therewith is subject to the inspection of the mayor of the city or the selectmen of a town and of their authorized experts at all reasonable times.

Section 4 of chapter 454 of 1903 provides that the city or town required by the party filing the schedule to make the purchase of a gas or electric plant may decide by vote at any time within sixty days after the filing of the schedule whether the property in the adjoining city or town which it may have the right to purchase shall be included with the plant concerning which the questions of purchase are to be decided. This vote must be made by the council in the case of a city or by the voters at a duly called meeting in the case of a town.

If the vote thus taken elects to include the property covered by the schedule in the adjoining city or town, the city or town thus voting shall have the same rights and be under the same obligations to buy this outlying property as if the property were within its limits. This vote does not prejudice the right of the city or town to deny its obligation to purchase any property, except on the ground that the property is outside of its limits. If the city or town required to purchase the plant within its limits does not vote within sixty days from the filing of the schedule to buy the outlying property, its rights to purchase such property shall cease.

Under section 1 of chapter 410 of 1905 the owner of any plant for the manufacture or distribution of gas or electricity for light, heat or power in a city or town that has passed its final vote in favor of a municipal plant, as required by statute, who desires to sell such plant to the city or town, shall within sixty days after the passage of this final vote file with the clerk of the city or town a conveyance of such parts of the plant as it is desired to sell, together with a schedule of these parts, and a statement of the price desired.

Upon the filing of this conveyance, the property thereby conveyed shall vest in the city or town, which shall be entitled to the immediate possession and use of this property. A city by a vote of its council, and a town by a vote of its selectmen, may agree with the owner upon the price to be paid for the plant conveyed; but such agreement is not binding as to a town until it is ratified by the majority vote of a town meeting called for action thereon. If the city or town does not agree with the owner as to such price, or notifies him within thirty days after the filing of the conveyance that it includes property that ought not to have been included, or does not include property that ought to have been included, either party may, within sixty days after the filing of the conveyance, apply to the supreme court for the county in which the city or town is situated for the appointment of commissioners to determine what property ought to be conveyed and its value. The supreme court shall appoint one or more commissioners to decide these questions, and these commissioners shall file a report of their findings.

If either party is aggrieved by the determination of the commissioners, such party may file objections thereto within thirty days, and the supreme court shall thereupon determine the questions raised by the petition and objections. The reasonable charges of the commissioners must be paid, one-half by each party, which, together with any expense of the litigation as to the purchase and valuation of the plant sold to the city or town, may be reckoned as a part of the indebtedness for which bonds may be issued.

The foregoing provisions of section 1 of chapter 410 of 1905 amended section 13 of chapter 370 of 1891. Under this earlier section the owner of a gas or electric plant was not obliged to file a schedule of the property that he wished to sell with the clerk of a city or town until after the final vote that fixed the obligation of that city or town to purchase such plant, if the owner wished to sell. Section 13 of this act of 1891 also permitted the commissioners appointed by the supreme court to fix the date of the sale and delivery of the plant, and the result was that the city or town got no plant until the end of the suit.

Section 15 of chapter 370 of 1891 provides that whenever the existing gas or electric plant in a city or town shall have been purchased by the city or town under that act, the rights of the former owner of the plant to manufacture and distribute gas or electricity in the city or town shall cease from the date of the purchase.

B 12. Any city or town, having obtained a plant for the purpose, as provided in the act, may generate and distribute electricity for light for municipal use and for the use of its inhabitants, under section 7 of chapter 370 of 1891. Chapter 454 of 1893, by section 6, authorized a city or town to continue the manufacture or distribution of electricity for heat or power after the city or town had acquired a plant formerly used for this purpose. By chapter 533 of 1894, any city or town that has established an electric plant under the provisions of chapter 370 of 1891, may furnish electricity to its citizens for heating and power, except for operating electric cars. Under section 2 of chapter 454 of the Acts of 1893, after a city or town has acquired an electric generating station within its own limits, and a distributing plant in an adjoining city or town that has been used for the supply of electrcity for public or private service from this generating station, the city or town that has acquired these generating and distributing plants may continue to supply electricity in the adjoining city or town. The city or town that acquired the plants is subject to the same rights and obligations as to franchises in the adjoining city or town as was the company that sold the plants.

B 13. A city or town may acquire an electric generating and distributing plant within its limits, including land, water power, machinery, poles, conduits, and conductors, under section 1 of chapter 370 of 1891. By section 1 of chapter 454 of 1893, a city or town that has purchased an electric generating plant within its limits may, under certain conditions, purchase distributing apparatus in an adjoining city or town that has been used to supply energy from the purchased plant.

B 14. A city or town owning a plant for the manufacture or distribution of electricity may reconstruct or enlarge the same by authority of section 5 of chapter 370 of 1891. If such reconstruction or extension amounts to more than ordinary maintenance and repairs, and is not an increase of distribution appliances for the supply of new consumers, then the reconstruction or extension must not be made until it is authorized by such a vote as is necessary to authorize an issue of bonds to acquire an electric plant.

B 15. Section 10 of chapter 370, Acts of 1891, provided that the price charged for electricity by a city or town shall be fixed, and shall not be changed oftener than once in three months. Any change in price shall take effect on the first day of a month, and shall be previously published in a newspaper of the city or town, if any is published there. By section 7 of this same chapter, a city or town that obtains an electric plant under it is authorized to distribute electric energy for the production of light, but nothing is there said about the sale of electricity for power and heating. In 1893, however, section 6 of chapter 454 of that year provided that when a city or town acquired an electric plant that had been used to distribute electricity for heat or power, the city or town might continue this use. Again, in 1894, chapter 533 of that year authorized any city or town that had established an electric plant under chapter 370 of 1891 to sell electricity for heat and power to its citizens, on such terms as might be agreed upon, subject in case of disagreement as to terms to an appeal to the gas and electric light commissioners. The statutes of 1893 and 1894, just named, contain no statements that limit the prices to be charged for electricity sold for power and heating by the provisions of section 10 of chapter 370, in 1891. This section 10 further provides that a deposit sufficient to cover the electricity to be consumed by any taker during three months in advance may be required, and that the supply may be shut off from any premises until all sums due for electricity furnished thereon, to whomsoever furnished, are paid. After three months default in payment, all apparatus belonging to the city or town may be removed from the premises where the default occurs, and such apparatus shall not then be replaced until payment of the amount due for electricity, plus the expense of its removal and return. Under this section (10), electricity for lighting shall not be sold by a city or town at less than cost, except with the written consent of the gas and electric light commissioners. Cost of electricity is defined to include all operating expenses, plus interest on the net investment in the plant made by the city or town, less any assessments for extensions that have been collected from consumers, at the rate paid on the bonds issued on account of the plant, plus the requirements of the sinking fund established to meet these bonds, and plus depreciation on the plant at the rate of not less than five per cent. per annum of its cost and losses. Any loss exceeding three per cent. of the investment in the plant may be charged in different years at not more than three per cent. per annum.

The price charged for electric lighting shall not be more than enough to earn a profit of eight per cent. per annum on the net investment in the electric plant of a city or town above the cost of the electric energy, as just defined. In fixing this cost, the electricity used by the city or town shall be charged to it at the cost rate.

Section 6 of this chapter (370) authorizes a city or town to make the payment of the cost of laying and maintaining apparatus for the distribution of electricity on given premises a condition precedent to the supply of electricity to the occupants of these premises.

(B 15.) Though section 10 of chapter 370 of the Acts of 1891 fixed the basis of minimum rates for electric lighting by a municipal plant, and limited the profit that might be made above this basis, it seems to have made no effective provision for the enforcement of the rates indicated. If a city or town, without petitioning the commissioners, charged higher or lower rates for electric lighting than were authorized by the statute, it does not appear that the commissioners had power to intervene, under the act of 1891. Chapter 426 of 1896, however, gave the supreme and superior courts jurisdiction, on application of the gas and electric light commissioners, to enforce all lawful orders of these commissioners and all provisions of law respecting municipalities engaged in the manufacture and sale of electricity for lighting by equity process. No action has ever been brought by the commissioners to affect the electric lighting rates charged by a city or town under this act of 1896. By chapter 410, section 7, of the Acts of 1905, jurisdiction is conferred on the supreme court for the county in which the city or town is located, on petition of the gas and electric light commissioners or of twenty taxable inhabitants of the city or town to compel the city or town to fix prices on the basis provided for in the statutes, as indicated above. This chapter 410 of the Acts of 1905 has been in force since July 1 of that year, but no decision has been recorded under its section 7, and as far as learned, no action has been brought.

Under the chapter and sections just named, the gas and electric light commissioners obviously have power to initiate proceedings for the regulation of municipal rates, and it remains to be seen whether the commissioners will construe the act to mean that they must take action of this sort when the statute is violated.

It may be noted in this connection that the gas and electric light commissioners have no authority to initiate proceedings to regulate the rates charged by gas and electric companies.

B 16. Section 7 of chapter 370 of 1891 provides that a city or town having obtained an electric plant may supply electric light under such regulations as it may establish. Any one aggrieved by the refusal of the city or town to supply electric light may appeal to the gas and electric light commissioners, and no city or town may be compelled to furnish electricity to any person or corporation except by an order of these commissioners. By section 8 of the same chapter, it is provided that the quality of the service to each consumer shall be regulated by the manager of the municipal electric light plant, subject to any ordinances of the city council, or to the regulations established in a town.

Chapter 533 of 1894 authorizes a city or town that has acquired an electric plant, in accord with the provisions of chapter 370 of 1891, to furnish its citizens electricity for heat and power, except for operating electric cars, on such terms as may be agreed upon. In case of disagreement, there is given a right of appeal to the gas and electric light commissioners. This provision appears to cover both the quality and price of the service.

B 19. Section 4 of chapter 370 of 1891 authorized a city or town to issue bonds for the construction, purchase, reconstruction or extension of an electric plant. These bonds were to be payable in not more than thirty years, and were not to bear interest at a rate of more than five per cent. While the bonds thus issued for a municipal electric plant are not included in the limit of indebtedness fixed by law for any city or town, the whole amount of bonds so issued and outstanding may not exceed at their par value the amount of five per cent. of the total valuation of estates in a town, or two and one-half per cent. of such valuations in a city, according to the last state valuation. Bonds may not be sold at less than par and accrued interest, and under the above named statute it was necessary to create a sinking fund for the payment of the bonds.

By section 9 of chapter 454 of the acts of 1893, in lieu of issuing bonds as above, a city or town may issue notes or scrip. In 1894, chapter 182 provided that either bonds, notes or scrip might be issued to cover the cost of a municipal electric plant, and that such bonds, notes or scrip may be met by annual payments extending over a period of not more than thirty years. The amounts necessary for these payments are to be assessed as taxes in the city or town, in each year, until the entire debt is paid. By electing to pay the cost of its municipal electric plant in the way last named, a city or town may escape the obligation to establish a sinking fund for the securities issued on account of the plant. Where there is no sinking fund, the cost or rate at which energy is sold to consumers does not necessarily include the amounts that would otherwise be paid into this fund.

B 20. Section 4 of chapter 370 of the acts of 1891 required all moneys received for electric service from a municipal plant to be paid over to the city or town treasurer. By chapter 410, section 3, of 1905, all income from the operation of a municipal plant, whether from the sale of electricity or otherwise, must be turned over to the treasurer of the city or town. Neither of these two statutes provides that the earnings of the electric plant are to be kept as a separate fund. Both section 4 of the act of 1891 and section 3 of the act of 1905, as just named, provide for the payment of the operating expenses of the electric plant out of the city or town treasury. In section 4 of chapter 410 of 1905 it is further provided that prior to the beginning of each fiscal year the manager of a plant shall furnish an estimate of the income from sales of electricity during the ensuing fiscal year, and of the expense of operating the plant during the same year, the interest on the bonds, notes or scrip issued to pay for the plant, depreciation at five per cent. on the cost of the plant, or such larger or smaller amount of depreciation as the gas and electric light commissioners may approve, the requirements of the sinking fund or debt incurred for the plant, and the loss, if any, in the operation of the plant during the preceding year. The excess of all the expense items just named over the estimated income from sales to private consumers must be included by the city or town in its annual appropriations and in the tax levy. The income from sales to private consumers and the appropriation just named are to be used to pay the expenses of the plant including the items named in the estimate for the fiscal year.

B 21. By section 10 of chapter 370 of the acts of 1891 it was provided that the price to be charged for electric service by a municipal plant should include depreciation reckoned at not less than five per cent. per annum on the cost and losses of the plant, unless the gas and electric light commissioners gave their consent to a lower price. While the original municipal lighting act thus made depreciation an element in the rates for electric service, there was no requirement that any particular sums be expended on the plant to keep the investment good, or that any depreciation fund be created.

The law remained in this condition until 1905, but section 4 of chapter 410 of that year provided that a sum representing five per cent. of the cost of a municipal electric plant, or such smaller or larger amount as the gas and electric light commissioners may approve, be included in an estimate of operating expenses for each fiscal year, and that any excess of such estimated expenses over the estimated income from private consumers during that year be included in the annual appropriation for maintenance of the plant and in the tax levy.

Cost of plant was defined in this act to be the total amount expended on the plant to the beginning of the fiscal year, for any purpose for which bonds, notes or scrip may be issued. Under the original municipal lighting act, chapter 370 of the laws of 1891, a city or town may issue bonds to pay for the purchase, construction or extension of an electric plant, as provided in section 4. Section 9 of chapter 454 of the acts of 1893 authorized the issue of notes or scrip in lieu of bonds for the purchase, construction or extension of an electric plant. By section 4 of chapter 410 of 1905 the issue of bonds, notes or scrip to cover operating expenses, including depreciation, is prohibited.

No part of the sum above named for depreciation, per section 4 of chapter 410 of the acts of 1905, might be used for any purpose other than renewals, in excess of ordinary repairs, extensions, reconstructions, enlargements and additions. The surplus, if any, of the annual allowance for depreciation, after making the current extensions and additions, in excess of ordinary reconstruction and repairs in any year, is to be kept as a separate fund, and used for renewals, other than ordinary repairs in succeeding years.

Such depreciation fund is to be kept by the city or town treasurer, subject to appropriation by the city council or selectmen or municipal light board, if any, for extraordinary renewals and extensions. No debt may be incurred for the extension or reconstruction of a municipal electric plant for a sum greater than the amount by which the cost of such extension or reconstruction exceeds the depreciation fund then on hand.

By chapter 411 of the acts of 1906, section 4 of chapter 410 of the acts of 1905 concerning depreciation funds, as above, was amended by changing the rate at which depreciation is to be computed from five to three per cent. annually on the cost of the plant. The same section was also further amended by excluding land and water power appurtenant thereto from the plant on which depreciation is to be computed. As the law now stands, the depreciation fund is to be made up by an annual contribution of three per cent. of the total cost of all parts of the electric plant, except its land and any water power appurtenant thereto, or such smaller or larger amount of depreciation as the gas and electric light commissioners may approve. This allowance for depreciation may be expended at once on extensions, or held until wanted for that purpose.

B 22. Section 4 of chapter 370 of 1891 authorized the issue of bonds for the purchase, construction or extension of a municipal electric plant, and for the payment of these bonds a sinking fund was required. If these bonds have more than ten years to run, the city or town at the time of contracting the debt must establish a sinking fund to be used for no other purpose than its payment, and must raise annually by taxation and contribute to this sinking fund an amount sufficient with its accumulations to extinguish the debt at maturity, under the section above named.

If the bonds are payable in ten years or less, the city or town may establish a sinking fund in the way just indicated, but if this is not done the city or town must raise by taxation annually not less than eight per cent. of the principal of the debt, and set it apart as a sinking fund, until enough has been thus raised with its accumulations to pay the debt at maturity.

As pointed out in reply to question B 19, a city or town now has the right, instead of issuing bonds and providing a sinking fund, to issue bonds, notes or scrip and provide for their payment by annual payments of sums raised by taxation.

B 39. During the period since 1891, only two petitions of cities or towns have come before the gas and electric light commissioners for authority to sell electricity at less than cost, as defined in section 10 of chapter 370 in that year. One was a petition by the town of Wakefield for the consent of the commissioners to a schedule of electric light and power rates, and to certain gas rates, that were admitted to be below cost, as defined in the section and chapter just named. The town had approved the desired gas and electric rates at a regularly-called meeting, and there was no opposition to the rates at the hearing before the commissioners.

As the gas and electric plants, which had previously been owned by a private corporation, were not transferred to the town of Wakefield until August 7, 1894, and as the above petition for the approval of rates was dated October first of that year, it is not easy to point out the effect of the rates named on the probable earnings of the plants. The matter is further complicated by the fact that parts of the plants owned by the above private corporation were located in other towns, and were not transferred to Wakefield.

Under the statutes, the town had the option to create a sinking fund for the bonds issued on account of the plants, or to provide for the redemption of these bonds by annual payments that were to be assessed as taxes in each year. The town chose the plan of annual payments, so that there was no sinking fund to be provided for in connection with the gas and electric rates that were approved by the commissioners. Rates for gas and electric service, as suggested by the town and approved by the commissioners, were approximately the same as the nominal rates of the private corporation of which the town had purchased the plants.

During the year ending June 30, 1894, the gross income from the gas and electric business of the corporation that subsequently sold a part of its plant to Wakefield was $21,989.00, and the net income from operation was $1,821.47. This gross income was greater than that of either of the two previous years, at least. For the nearly eleven months ending June 30, 1895, the gross income of the town of Wakefield from commercial lights was $16,543, and the operating expenses of its gas and electric plants were $19,205.86. In this same period the electric plant supplied an average of 97 arc street lamps of 1,200 nominal candle power each, during 114 hours per month.

Allowing the same rates for energy used in street lamps that were charged for commercial service, it seems doubtful whether these rates, approved by the commissioners, were more than sufficient to cover operating expenses and interest on the investment, without regard to depreciation. On the other hand, higher rates might have reduced both gross and net incomes.

The other petition to the commissioners for the approval of electric rates that were below cost, as defined by the statute, was that of the town of Hudson, in 1898. On January 15, 1897, the town had taken the existing electric plant in Hudson, at the suit of the electric company there, and the town subsequently discarded the purchased plant and built a new one. By June 30, 1898, the town had thus invested $39,518 in electric plant. The petition of the town was for the approval by the commissioners of a rate of 20 cents per kilowatt hour for commercial incandescent lighting.

During the six months ending June 30, 1898, the operating expenses of the municipal electric plant at Hudson were $2,409.49, the interest on the total investment in the plant at 4 per cent. per annum, the rate paid on the bonds, was $790.36, and the depreciation on the investment at 5 per cent. amounted to $987.95. No sinking fund had been established by the town for the payment of the electric bonds, and no item on this account was included in the computed cost of electric service.

The operating expenses, interest and depreciation charges just mentioned amounted to $4,187.80 during the six months in question, and the total output of the electric station for the same period was 29,914 kilowatt hours, of which 59 per cent. was distributed for commercial service, including incandescent lamps in the town buildings, and 41 per cent. went into the street lighting circuits. A large loss of energy occurred between the electric station and the meters of consumers, for these meters registerd only 7,019 kilowatt hours for the commercial lighting, including that in the town buildings. The commissioners concluded from these facts that the cost of these 7,019 kilowatt hours, as defined by the statute, was 59 per cent. of the $4,187.80 above named, or 35 cents per kilowatt hour. It may be noted that the cost of energy used in street lamps was no doubt less than 35 cents per kilowatt hour. If 59 per cent. of the operating expenses plus interest is divided by the number of kilowatt hours sold to consumers, the result is 26 cents per kilowatt hour. The commissioners approved the rate of 20 cents per kilowatt hour, as desired by the town, to remain in force until January, 1899, on July 28, 1898, and later the town reduced the net rate to 15 cents by a discount.

(B 39.) A single case has come before the gas and electric light commissioners as to the annual appropriation for depreciation, under section 4, chapter 410, of 1905. This was a petition by the mayor of the city of Holyoke for a reduction in the amount of depreciation to be appropriated on account of its gas and electric plants, in 1906.

It appeared that the city had taken possession of these plants on December 15, 1902, as the result of a suit brought to enforce their purchase by the private corporation that owned them.

The purchase of the original plants involved an expenditure of $829,252.21, of which about $110,000 represented the expense of the litigation, and $267,722.94 had been expended on improvements, making the total outlay $1,096,975.15 at the time of the hearing. Parts of the old plants that cost the city $45,000 were discarded shortly after the purchase, and were replaced by more modern apparatus. In their decision on the petition, the majority of the commissioners said that the $110,000 expended in litigation and the $45,000 represented by the discarded equipment constituted a depreciation of $155,000, for which provision should be made.

During 1906 the amount to be paid on the principal of bonds issued for the purchase of the Holyoke plants was $36,600, and the interest payment on the bonds was $28,185. At the statutory rate of 5 per cent. on the above $1,096,975, the depreciation to be appropriated by the city, in 1906, amounted to $54,849, and the petition sought a reduction of this sum. Such reduction of the depreciation charge was refused by a majority of the three commissioners, largely on the ground that even with depreciation computed at 5 per cent. it would require some years to make up the above losses while covering current depreciation of the plants; report of gas and electric light commissioners 1906, page 45.

The third commissioner dissented from this decision, and it was followed by a petition to the legislature that resulted in the reduction of the rate of depreciation to three per cent., and the exclusion of land and its appurtenant water power from the items on which depreciation is to be computed (chapter 411, acts of 1906).

(B 39.) In May, 1894, the supreme court of Massachusetts, in Citizens' Gas Light Co. *vs.* Wakefield, decided that chapter 370 of 1891, authorizing cities and towns to establish gas and electric plants for the supply of their inhabitants, is not in conflict with the constitution of the state. The town of Wakefield contended in this case that its two votes in accord with the statute did not create an obligation to purchase plants within its limits, but the court enforced this obligation. Right of trial by jury to determine the value of the purchased plants was contended for by the town and denied by the court.

Hudson Electric Co. *vs.* Hudson, decided by the state supreme court on April 1, 1895, involved another attempt of a town to avoid its obligation to purchase an electric plant within its limits after the town had voted to establish such a plant. In this case one of the votes of the town was not taken in the language of the statute, but it was decided that the meaning of the vote was to be gathered from the entire record. After the electric company filed its schedule of property, the town voted not to establish a plant, but the court held that the obligation to purchase the existing plant had been fixed by two former votes.

B 40 (a). As stated in detail in reply to question B 15, a city or town cannot legally sell electric energy below the special cost defined by the statute, without the approval of the gas and electric light commissioners, if the energy is used for lighting. Neither can energy for lighting be sold at a profit above this special cost of more than eight per cent. per annum on the net investment in the municipal electric plant. Where electric energy is used for motive power or heating, it seems doubtful if the limitations as to price fixed by the statutes apply.

B 40 (b). Section six of chapter 370 of the acts of 1891 provides for the assessment on consumers of the cost of appliances located on their premises by a municipal plant for the distribution of electricity there, as stated in reply to question B 15. This section no doubt covers meters, and would warrant the collection of meter rent instead of the entire first cost and a subsequent charge for maintenance, as authorized by the statute. As long as the rent or charge for meters and other appliances is not so excessive as to amount to a charge for electric lighting, there seems to be no limit on its amount.

B 40 (c). Interest on bonds issued to pay for municipal electric plants, and the operating expenses of these plants, were to be provided for by city or town appropriations, under section 4 of chapter 370 of 1891. Section 4 of chapter 440 of 1905, which repealed the section above named, provides that the excess of the sum of annual payments on account of the sinking fund or debt incurred for the plant, interest on this debt, depreciation charges, operating expenses, and the loss in operation during the previous year, over the estimated income from private consumers, shall be included in the annual appropriations of the city or town and in its tax levy.

C—PUBLIC SUPERVISION OF PRIVATE COMPANIES.

Questions C 1 to C 57, inclusive, do not apply to the public plants.

(A. The length of time allowed for this report did not permit answers to Schedule C.)

Mr. Adams answers for questions 1, 2, 3, 8, 9, 11, Uxbridge and Northbridge, that this company was incorporated in Massachusetts under the general law in August, 1889; that no changes have been made in its charter, and that the company paid during the past year to the local or state government $5 for the privilege of incorporation, and that the area to be served is "Uxbridge and Northbridge."

The following answers for the respective plants C 1 to 57 are all by Mr. Prichard:

C 1. Date of incorporation of company?
Abington and *Rockland.* November 25, 1889.
Attleboro. October, 1904.
Beverly. 1859.
Fitchburg. May 13, 1852.
Gardner. 1891.
Northampton. 1887.
Salem. December, 1881.

C 2. Place of incorporation?
Abington and *Rockland.* Abington.
Attleboro. Attleboro.
Beverly. Beverly.
Fitchburg. Fitchburg.
Gardner. Gardner.
Northampton. Northampton.
Salem. Salem.

C 3. Was incorporation under (a) general law, (b) special legislative act, (c) administrative order, (d) other method?

Abington and *Rockland, Attleboro, Beverly, Gardner,* and *Salem.* General law. *Fitchburg.* Special charter; see Public Statutes of 1852. *Northampton.* ————

C 4. For what length of time was original incorporation to be effective?

"Perpetual" is the answer in each case, except Fitchburg, which is answered by the word "Unlimited."

C 5. If this duration has since been extended or decreased, state when, how, for what period of time and reasons therefor. Question not answered.

C 6. Was the power of amendment or alteration of this original charter reserved to the state? No answer given for any of the companies, except Beverly, Northampton and Salem, which are answered by the word "No."

C 7. State succinctly the powers conferred by the charter.

Abington and *Rockland, Attleboro.* ————

Beverly. To furnish gas in the town of Beverly.

Fitchburg. See statute, 1852.

Gardner. To carry on the business of furnishing electric light and power (not stated as to territory).

Northampton. To furnish electricity for lighting and power purposes in the city of Northampton.

Salem. To conduct electric lighting business in the city of Salem.

C 8. What were the limitations specified in the original charter particularly as regards (a) area to be served, (b) stock to be issued, (c) bonds to be issued, (d) dividends to be paid, (e) prices to be charged, (f) character of service, (g) amperage and voltage of current, (h) location of wires, (i) audit of accounts, (j) taxation, (k) compensation for franchises, (l) publication of reports, (m) making of returns to governmental authorities, (n) other important matters?

Abington and Rockland. (a) Abington and Rockland and adjacent territory. (b) $30,000. (c) ———— (d to n) None.

Attleboro. (a) Attleboro, North Attleboro and Wrentham. (b) $65,000. (c) to (k) ————. (l), (m), (n) State law.

Beverly. (a) Beverly. (b) $40,000. (c) to (n) ————

Fitchburg. (a) Town of Fitchburg. (b) $100,000. (c) ————. (d), (e) No provision. (f) Gas. (g) to (i) None. (j) to (n) ————

Gardner. (a) No. (b) $30,000. (c) to (n) ————

Northampton. (a) City of Northampton. (b) $40,000; vote of company, 117,400. (c) Vote of company $58,000, since retired. (d), (e), (g), (h), (i), (k), (l), (n) No provisions. (f) Electric light. (j) ———— (m) According to legal requirements.

Salem. (a) None. (b) $10,000. (c) to (n) "None."

C 9. If any changes have been made in the original charter as regards powers and limitations of the company, state when, how, to what extent, and for what reasons.

Abington and *Rockland.* Increased the capital to $75,000.

Attleboro. None.

Beverly. Privilege to do electric lighting secured in 1887, as per provision of general law increasing powers of gas companies.

Fitchburg. Change of name in 1900 from "Fitchburg Gas Company" to "Fitchburg Gas and Electric Light Company" and increase of stock.

Gardner. No changes.

Northampton. Authority to supply electric power.

Salem. 1882 increased to $20,000.
1885 " " 40,000.
1886 " " 70,000.
1889 " " 140,000.
1892 " " 175,000.
1902 " " 275,000.

C 10. What fees were required at time of incorporation?

Abington and *Rockland, Attleboro, Gardner.* 1/20 of 1 per cent. of the capital stock.

Beverly. Unknown. See law.

Fitchburg. No.

Northampton and *Salem.* ——————

C 11. Was any payment made during the past year to local or state governments for privilege of incorporation? No.

C 12. What state authorities have power to supervise, control or regulate the operations of the company? The Board of Gas and Electric Light Commissioners has supervision of all gas and electric light plants in the state, both public and private. J. H. G.

Mr. Prichard does not answer the remaining portions of Schedule C, excepting as follows:

C 43. If any other state board (than the Board of Gas and Electric Light Commissioners), commission or other authority has control or supervision over electric lighting companies, give statutory provisions relating to its powers and functions. Answer "No," or "——————."

C 45. What have been the effects of this supervision?

Abington and *Rockland.* Advantageous.

Attleboro. Of great assistance.

Beverly. Of advantage from all points of view.

Fitchburg. ——————

Gardner. "Advantageous to both the public and the corporation."

Northampton. "Advantageous."

Salem. Very helpful.

C 46. What powers of supervision over the construction and operation of the plants of private companies does the city possess?

Abington and *Rockland, Attleboro.* ———— *Beverly, Fitchburg.* None. *Gardner.* State law. *Salem, Northampton.*

C 47. What provision has the city made for the exercise of its power of supervision? All dash, except Beverly and Gardner, "None."

C 48. How frequently and with what efficiency does the city exercise its powers of supervision?

No answer except for Gardner, which is answered by the word "Never."

C 49. Has the company resisted the enforcement of the legal provisions relating to providing for public supervision? All dashed, except Fitchburg, Gardner and Salem, "No."

C 52. What taxes are paid to state authorities? Explain fully. (a) Basis of levy, (b) method of assessment, (c) principles of valuation, (d) rate of taxation, state tax rate for all companies, $16.87; (e) method of collection, (f) disposition of receipts, (g) other important matters.

Abington and Rockland. $293.25. (a) Taxed upon market value of capital stock less valuation; locally assessed.

Attleboro. (a) A franchise tax upon the par value of the capital stock. From this valuation is deducted the value of the real and personal property of the company, as found by the local assessors.

Beverly. (a) $1,468.92.

Fitchburg. (a) Difference between local and capital: Corporation, $659.58; common, $69.09.

Gardner. Corporation tax, $163.01.

Northampton. (a) Value of capital stock less valuation taxed by local authorities. $987.56.

Salem. $2,354.20. (a) Valuation on capital stock less valuation of real and personal property as found by the local assessor $175 per share at $16.87. (b) Market value of capital stock.

C 53. What taxes are paid to local authorities? Explain fully. (a) Basis of levy, (b) method of assessment, (c) principles of valuation, (d) rate of taxation, (e) method of collection, (f) disposition of receipts, (g) other important matters.

Abington and Rockland. $1,386.73. (a) On real and personal property. (b), (c) Judgment of board of assessors. (d) $24. (e), (g) ————. (f) General fund.

Attleboro. (a) Valuation as determined by local board of assessors on personal and real estate. (b), (c), (e), (g) ———— (d) $17 per $1,000. (f) To general fund.

Beverly. $1,502.68. (a) to (g) ————

Fitchburg. $432.775. $3,209 for electric department. Gas and electric, $4,600.26. (a) to (g) ————

Gardner. $828.32. (a), (b), (c), (e), (g) ———— (d) 1906, $21. (f) General fund.

Northampton. $1,418.66. (a) to (g) ————

Salem. $5,980.89. (a) Real and personal property as assessed by local board. (b), (e), (g) ———— (c) Book value of the real and personal property. (d) $17.50 per $1,000. (f) General fund.

C 54. If electric lighting companies are taxed differently from corporations and other property, state how and to what extent.

The answers all indicate that the companies are not taxed in any special manner.

C 55. What fees or licenses are paid to the state or local authorities?

Abington and *Rockland.* None, except proportion of expenses of the Board of Gas and Electric Light Commissioners.

Attleboro, Gardner, Salem. Gas and Electric Light Commission tax.

Beverly. Gas and Electric Light Commission tax, $13.03.

Fitchburg, Northampton. None.

C 56. Is the company subject to assessment for local improvements? "No" for all plants except Fitchburg, which is left blank.

C 57. Are such assessments actually levied? The answers indicate that no such assessment is levied for any plant.

D—FRANCHISES OF PRIVATE COMPANIES.

Mr. Adams answers none of the questions D 1 to D 61 inclusive except for the private company Uxbridge and Northbridge, for which Mr. Prichard handed in no schedule whatever.

A—*Uxbridge* and *Northbridge.*

D 1 to D 35 inclusive. ———

D 36. Give complete list of all electric lighting franchises now in force. It is the practice to grant franchises from time to time as extensions are required.

The record of the first franchise was not found and the following answers relate to the form of franchise now in use.

Mr. Adams's answer indicates that the first franchise was granted before June 30, 1890, by the selectment of the towns; that it was without time limit and not in terms exclusive, and that the lines at present cover 161,814 feet of streets.

D 37, 38, 39, 40. ———

D 41. State for each (franchise) the period within which the construction had to be begun.

D 42. State for each (franchise) the period within which the plant had to be completed.

D 43. State for each (franchise) the provisions regarding the rates to be charged.

D 44. State for each (franchise) the povisions regarding: (a) Character of service. (b) Voltage and amperage of current. (c) Direct and alternating current. (d) Location of wires. Cross-arms for wires to be at least 18 feet above the ground. (e) Other elements of service. Poles to be of chestnut and at least 30 feet long.

Answer to all others, "No provisions."

D 45 to 54, 56. No provisions.

D 55. In like manner, state for each (franchise) the provisions as to transfer of franchise to third parties. Grants run to the electric company, its successors or assigns.

D 57. State for each (franchise) the provisions as to other important matters, including renewals. The grant designates the route along which poles and wires may be erected, as per map filed with the selectmen.

D 58-63. ———

D 64. By whom are franchise grants drafted? By the company.

A. The time allowed for this report did not permit answers to Schedule D.

In general it is true that franchises in Massachusetts are granted for no definite time and may be revoked by town or city authorities or by the Legislature at any time without compensation to the person or company holding the franchise. Franchises are not in terms exclusive, but there is an appeal to the gas and electric light commissioners from any franchise granted by a local authority that would allow competition and it is the fixed policy of the commissioners to annul franchises that would set up competition between two gas plants, or between two electric plants.

By Mr. Prichard.

D 1. Does the municipality have power to grant franchises to electric light companies? Yes, all plants, except that in the schedule for Northampton the phrase "subject to the approval of the board of gas and electric light commissioners" is added.

D 2. How was the power conferred, by: (a) General law applicable to all cities of the state. (b) By general law applicable to all cities in a class. (c) By special act applicable to this city alone. (d) Administrative order. (e) Other methods?

(a) Yes, for all plants except Salem. (b), (c) The answer is "No" for all plants, or the question is unaswered. (d), (e) All plants. ————

Questions D 3 to D 36 inclusive are left unanswered in all schedules.

D 36. Give complete list of all electric lighting franchises now in force in the following form:

	Date of Issue.	*By what authority granted.*	*Duration.*	*Exclusive or competitive.*	*Approximate mileage of streets granted to company.*
Abington & Rockland..............	....	Selectmen	Perpetual	Exclusive by common practice	Abington 30 Rockland 30
Attleboro	1888	Selectmen	Perpetual	Exclusive by general practice	Unknown
Beverly, first franchise............	1887	Selectmen	Perpetual for Beverly	Exclusive by common practice	....
Second franchise	1901	Legislature, for Wenham, Hamilton & Manchester City authority	....	....	....
Fitchburg	....		Perpetual	Exclusive by common practice	....
Gardner, 2 franchises.............	(1) Feb. 1, 1890	Selectmen	Perpetual	Exclusive by common practice	Unknown
	(2) October 17, 1899	Selectmen	Perpetual	Exclusive by common practice	....
Northampton	1887	....	....	....	....
Salem	1882	Board of Aldermen	Perpetual	Exclusive by common practice and policy	81 miles

D 37. Following the designation used in column 1 of preceding question, state for each franchise the conditions upon which franchises may be declared forfeited.

No provisions.

D 38. State for each the time, method and terms of acquisition by the city.

Abington and *Rockland*. State law. *Attleboro*. By statute. *Beverly, Salem.* ——— *Gardner*. No special provision. *Northampton*. No special provision.

D 39. In like manner state for each the method by which plant thus acquired may be utilized.

Abington and *Rockland, Beverly, Salem.* ——— *Fitchburg*. None. *Gardner, Northampton*. No special provision.

D 40. In like manner state for each whether consent of abutting property owners was required before pipes could be laid.

Abington and *Rockland, Beverly.* ——— *Attleboro, Fitchburg*. None. *Gardner*. No special provision. *Northampton*. Legal regulation. *Salem*. Not at that time.

D 41. In like manner state for each the period within which the construction had to be begun.

Abington and *Rockland, Attleboro, Fitchburg, Salem*. None. *Beverly*. ——— *Gardner*. No special provision. *Northampton*. No regulation.

D 42. In like manner state for each the period within which the plant had to be completed.

Abington and *Rockland, Attleboro, Fitchburg, Salem*. None. *Beverly*. ——— *Gardner*. No special provision. *Northampton*. No regulation.

D 43. In like manner state for each the provisions regarding rates to be charged.

Abington and *Rockland, Attleboro, Fitchburg, Salem*. None. *Beverly*. ——— *Gardner*. No special provision. *Northampton*. No regulation.

D 44. In like manner state for each the provisions regarding: (a) Character of service. (b) Voltage and amperage of current. (c) Direct or alternating current. (d) Location of wires. (e) Other elements of service.

The answers all indicate that there are no provisions on these matters. In the Gardner schedule, subhead (d) (the location of wires), "and poles" is added, followed by "Yes," and in the Northampton schedule the answer for subhead (d) is "No special."

D 45. In like manner state for each the provisions regarding plant and equipment.

D 46. In like manner state for each the rights reserved to the city to regulate operation.

D 47. In like manner state for each the provisions as to compensation, including free services.

D 49. In like manner state for each the provisions as to street paving.

D 50. In like manner state for each the provisions regarding removal of wires.

The answers in all schedules indicate that there are no provisions on these matters.

D 51. In like manner state for each the provisions as to examination of records.

D 52. In like manner state for each the provisions as to audit of accounts.

D 53. In like manner state for each the provisions as to publication of reports.

D 54. In like manner state for each the provisions as to returns to public authorities.

D 55. In like manner state for each the provisions as to transfer of franchises to third parties.

D 56. In like manner state for each the provisions as to labor.

D 57. In like manner state for each the provisions as to other important matters, including renewals.

All these questions are answered in all schedules by the word "none," or left unanswered, except in the schedule for Attleboro, where questions D 51, D 52, D 53, D 54 and D 55 are answered by the word "law," or "excepting state law."

D 58. Has the municipality experienced difficulty in forcing companies to live up to the terms of their franchise?

Abington and *Rockland, Attleboro, Gardner, Salem.* No. *Beverly, Fitchburg, Northampton.* ———

D 59. State what provisions it has not been able to enforce, and why. *Abington* and *Rockland, Attleboro, Gardner.* None. *Beverly, Fitchburg, Northampton, Salem.* ———

D 60. What remedies, penalties and means of enforcing the above provisions (D 37-57) have been provided? *Abington* and *Rockland, Gardner.* None. *Attleboro, Beverly, Fitchburg, Northampton, Salem.* ———

D 61. How much deliberation has usually been given in the granting or renewal of franchises?

Abington and *Rockland, Northampton.* ———

Attleboro. Public hearings are advertised and held before the franchise is granted.

Beverly and *Fitchburg.* Ample.

Gardner. Due deliberation.

Salem. Fully debated and considered in public hearing.

D 62. Has the exercise of the franchise granting power been attended with public scandal, and if so, in what respect?

Abington and *Rockland, Attleboro, Beverly, Fitchburg, Gardner, Salem.* No. *Northampton.* ———

D 63. How much publicity has usually accompanied the granting or renewal of franchises?

Abington and *Rockland.* Advertised in newspapers as required by law.

Attleboro, Beverly, Gardner, Salem. Advertised as required by law.

Fitchburg. Public hearing as required by law.

Northampton. ———

D 64. By whom are franchise grants usually drafted?

Abington and *Rockland, Attleboro.* By selectmen through town council.

Beverly. Counsel for the city.

Fitchburg, Salem. City counsel.

Gardner. Counsel for the corporation.

Northampton. ———

LABOR AND POLITICS

Massachusetts Electricity Works

(Schedule II)

By ALTON D. ADAMS and CHARLES F. PRICHARD

NOTE.—Mr. Alton D. Adams filled one schedule for each of the plants, public and private, and Mr. C. F. Prichard one schedule for each of the plants, public and private, with the exception of that for the Uxbridge and Northbridge Electric Company. All answers made by each investigator are given. Where the answers of the two investigators are identical, no designation of the source of the answer is shown. Where the answers differ each answer is given distinction by the initial of the author.—J. H. Gray.

NOTE (by Mr. Adams)—As Mr. Charles F. Prichard is one of the directors of the Beverly company, only those answers that could be obtained from the public records and from inspection of the property are given as to its plant.

E—ORGANIZATION.

E 1. What is the supreme governing body of the service, whether city council, board, commission or board of directors?

Municipalities.

Chicopee, Taunton. A. Mayor and city council. P. Manager.

Danvers. Municipal light board.

Holyoke. A. Mayor and city council. P. Manager.

Marblehead, North Attleboro, Peabody. Municipal light board.

Westfield. A. Selectmen. P. Selectmen, ex-officio.

Companies.

Board of directors in each case.

E 2. Number of members.

Municipalities.

Chicopee, Holyoke. P. 1.

Danvers, Marblehead, North Attleboro, Peabody, Westfield. 3.

Taunton. A. Eight aldermen, 24 councilmen.

Companies.

Abington and Rockland, Gardner. 9.

Attleboro. P. 5.

Beverly, Northampton, Uxbridge and Northbridge. 5.

Fitchburg. 7.

E 3. Method of selection of members, including nominations and election.

Municipalities.

Chicopee, Holyoke. A. Elected by popular vote. P. Appointed by mayor.

Danvers. A. Town vote. P. State law.

Marblehead. A. Elected by town ballot for three years. P. State law.

North Attleboro, Peabody, Westfield. A. Town voters elect. P. State law.

Taunton. A. Elected annually by popular vote.

Companies.

Abington and Rockland. A. Votes of stockholders. P. Regular corporation law.

Attleboro, Beverly, Fitchburg, Salem, Uxbridge and Northbridge. A. Votes of stockholders.

Gardner. A. Votes of stockholders. P. Usual legal corporation method.

Northampton. A. By stockholders of the company. P. Elected at annual meeting of stockholders.

E 4. Do political considerations influence selections?

Municipalities.

Chicopee, Holyoke. A. Yes. P. No.
Danvers. A. Yes. P. "No."
Marblehead. A. Yes. P. "Yes."
North Attleboro. A. Yes.
Peabody. A. Yes. P. To a limited extent.
Taunton. A. Yes.
Westfield. A. Yes. P. No.

Companies.

Abington and Rockland, Northampton. P. No.
Attleboro, Beverly, Uxbridge and Northbridge. ——————
Fitchburg, Gardner, Salem. A. No.

E 5. Is the board bi-partisan or non-partisan?

Municipalities.

Chicopee, Taunton. A. Bi-partisan.
Danvers. A. All of one party. P. Non-partisan.
Holyoke, Westfield. P. Non-partisan.
Marblehead. Non-partisan at present.
North Attleboro. ——————
Peabody. A. Bi-partisan. P. Non-partisan.

Companies.

Abington and Rockland, Northampton. P. Non-partisan.
All others. ——————

E 6. Term.

Municipalities.

Chicopee. A. Year to year. P. Until removed.
Danvers, Marblehead. Three years.

Holyoke. One year.

North Attleboro. A. Three years. P. State law.

Peabody. A. Three years. P. Three years, one retiring each year.

Taunton. A. One year.

Westfield. P. One year.

Companies. In the answers of each investigator where the question is answered at all it is "One year."

E 7. Do all retire at the same time?

Municipalities.

Chicopee. ——————

Danvers. A. No. P. One each year.

Holyoke. Yes.

Marblehead. One each year.

North Attleboro. A. One each year. P. State law.

Peabody. P. One each year.

Taunton. A. Yes.

Westfield. P. Yes.

Companies.

Abington and Rockland. A. Yes. P. Not unless so desired by stockholders.

Attleboro, Fitchburg, Salem, Uxbridge and Northbridge. A. Yes.

Beverly. ——————

Gardner. A. Yes. P. Not in practice.

Northampton. A. Yes. P. Yes, if not re-elected.

E 8. State salaries or allowances for services in connection with service.

Municipalities.

Chicopee. A. Regular salaries as mayor and councillors. P. $1,200 paid the manager.

Danvers. A. Each $50 per year, and one of the three gets $100 yearly for keeping the books of the plant. P. Two $50 each, one $150—total, $250.

Holyoke. A. None, except regular salary of mayor and councillors. P. Managers $4,000.

Marblehead. $15 per week for one member; others none.

North Attleboro. A. $75 each per year. P. $75 each; total, $225.

Peabody. None.

Taunton. A. Regular compensation of mayor and councillors.

Westfield. P. None.

Companies.

Abington and Rockland. A. $75 for directors during the year. P. $75 per year for board.

Attleboro. A. Nothing.

Beverly. A. Total $975 during the year.

Fitchburg. A. $310 for all directors during the year. P. $230 per annum.

Gardner, Northampton. Nothing.

Salem. A. $600 for all directors during the year.

Uxbridge and Northbridge. A. $30 total for all directors during the year.

E 9. May they also hold other public office?

The answers for all plants, public and private are "Yes," where the question is answered at all.

E 10. Do they always, generally, exceptionally, or never?

Chicopee. P. Generally.

Danvers. A. Not usually. P. Generally do.

Holyoke. P. Does not.

Marblehead. A. Exceptionally. P. Occasionally do.

North Attleboro. A. Often. P. Never.

Peabody. P. Frequently.

Taunton. ————

Westfield. P. Yes.

Companies.

All answers ———, except that for *Northampton,* which Mr. Prichard answers "Exceptionally."

E 11. May they also conduct private business?

Municipalities.

Chicopee. A. Yes. P. Law does not prevent.

Holyoke. A. Yes. P. No.

All others "Yes," except Prichard does not answer for *Taunton.*

Companies.

The answers are all "Yes" where the question is answered at all.

E 12. What has been the custom?

Municipalities.

Chicopee. A. To conduct private business. P. Not to engage in other business.

Danvers. A. They have other business. P. "To get all they can."

Holyoke. A. To have business. P. Not to do so.

Marblehead. A. Do other business. P. To conduct their own business.

North Attleboro. A. They usually have other business. P. As above.

Peabody. A. They have other business. P. They do.

Taunton. A. Usually have other business.

Westfield. A. They do private business. P. Other offices.

Companies.

Abington and Rockland. A. To have business. P. To do so.

Attleboro, Fitchburg, Salem. A. To conduct business.

Beverly, Uxbridge and Northbridge. A. To have business.

Gardner. A. To conduct business. P. To do so.

Northampton. A. To have business. P. Generally engaged in private business.

E 13. How often does the governing body meet?

Municipalities.

Chicopee. P. Has no governing body.

Danvers. Every week.

Holyoke. P. Daily.

Marblehead. A. Monthly. P. Regularly once a week; oftener if necessary.

North Attleboro, Peabody. Monthly.

Taunton. A. Aldermen bi-monthly; councilmen monthly.

Westfield. P. Every week.

Companies.

Abington and Rockland. P. When called together.

Attleboro, Fitchburg, Salem. A. Monthly.

Beverly. ——————

Gardner. A. Once a year and on call. P. When called together by president.

Northampton. A. Quarterly. P. At call of the president, once or twice a year.

Uxbridge and Northbridge. A. Yearly.

E 14. Have they a technical knowledge of the service?

Municipalities.

All, "No," except:

Chicopee. A. No. P. The manager has.

Holyoke. A. No. P. Yes.

Peabody. A. Only limited. P. No.

Taunton. A. No.

Companies.

Abington and Rockland. P. Yes.

Attleboro, Fitchburg, Salem, Uxbridge and Northbridge. A. No.

Beverly. ——————

Gardner. A. No. P. Yes.

Northampton. A. Probably not. P. Yes, in a general way.

E 15. What is the scope of the authority vested in this body?

Municipalities.

Chicopee. A. The mayor selects the manager and directs his policy, and the council fixes the term of office of the manager and his compensation, and makes the appropriations.

Danvers, North Attleboro, Peabody. A. Authority to construct and operate plant. P. Statute.

Holyoke. A. The mayor appoints the manager and directs his actions and the council fixes the compensation and term of office of the manager, and makes the appropriations. P. Supreme.

Marblehead. A. Full authority to construct, maintain and operate the plant. P. State law.

Taunton. A. The mayor appoints the manager and the council fixes his term of office and compensation and makes appropriation for the plant. The manager is under control of the mayor, but the extent of this control is now being contested in the Massachusetts courts.

Westfield. A. To employ the manager and direct the construction and operation of the plant. P. Same as the municipal light board.

Companies.

Mr. Adams answers for all plants except *Beverly,* "The control of the corporate business." Mr. Prichard answers for *Gardner,* "Supreme authority." No other answers.

E 16. Is it fully exercised in practice?

Municipalities.

Chicopee. ——————

Danvers. A. Usually. P. Yes.

Holyoke. A. Manager largely in control. P. Yes.

Marblehead, North Attleboro. Yes.

Peabody, Westfield. A. Manager exercises fair degree of authority. P. Yes.

Taunton. A. In Taunton the manager exercises large authority.

Companies.

Abington and Rockland, Beverly, Northampton. ——————

Attleboro. A. Defer much to the manager.

Fitchburg. A. Largely endorse manager.

Gardner. P. Yes.

Salem. A. Manager exercises a large degree of authority.

Uxbridge and Northbridge. A. Mainly through the control of the treasurer.

E 17. If there is any intermediate person or body between the supreme governing body as above described, and the chief executive officer, give its constitution, organization, functions, etc.?

Municipalities.

None given.

Companies.

Abington and Rockland. A. Stone & Webster, Boston, are the managers and next in authority to the board of directors.

Attleboro. A. The president, to some extent.

No others given.

E 18. What is the official title of the chief executive officer (or officers, if more than one of equal rank)?

Municipalities.

"Manager" for all except *Holyoke,* which Mr. Prichard answers "Manager, also one superintendent, electric department, and one superintendent of gas department."

Companies.

Abington and Rockland. A. Managers. P. General manager.

Attleboro, Salem. A. Manager.

Beverly. P. Manager.

Fitchburg. A. One man as treasurer and manager.

Gardner. A. Treasurer. P. Manager.

Northampton. President and manager.

Uxbridge and Northbridge. A. One man is treasurer and manager and is chief executive officer.

E 19. Is the head of the engineering service subordinate to the chief executive officer, co-ordinate with him, or united in one man?

Municipalities.

Chicopee. A. The manager is chief engineer. P. No subordinate executive positions.

Danvers. A. United in one. P. Vested in the manager.

Holyoke. A. The manager is head of engineering service. P. Yes, subordinate.

Marblehead. United in manager.

North Attleboro, Taunton. A. The manager is the chief engineer. P. One man.

Peabody. A. The manager is head of engineering service. P. In one man.

Westfield. A. The manager is chief engineer. P. One man manager.

Companies.

Abington and Rockland. A. Subordinate. P. The latter.

Attleboro. A. The manager is head of the engineering.

Beverly. A. Subordinate. P. Yes.

Fitchburg. A. Subordinate.

Gardner. Subordinate.

Northampton, Uxbridge and Northbridge. A. Subordinate to manager.

Salem. A. United in one man.

E 20. Is the head of the engineering service an engineer by profession?

Municipalities.

Chicopee, Westfield. A. By practice.

Holyoke. A. By practice. P. Yes.

Marblehead. A. Practical man. P. No.

Taunton. A. By practice. P. None.

All others. Yes.

Companies.

Abington and Rockland. Yes.

Attleboro, Fitchburg, Northampton. A. Yes.

Beverly. P. Yes.

Gardner. A. Practical man. P. Yes, stationary.

Salem. A. No.

Uxbridge and Northbridge. A. Practical man.

E 21. Is the chief executive officer an engineer by profession?

Municipalities.

Chicopee, Westfield. A. By practice.

Danvers. A. Yes. P. Same person (as E 20?).

Holyoke, Taunton. A. By practice. P. Yes.

Marblehead. A. By practice.

North Attleboro, Peabody. Yes.

Companies.

Abington and Rockland. Yes.

Attleboro, Northampton. A. Yes.

Beverly. P. No.

Fitchburg, Salem. A. No.

Gardner, Uxbridge and Northbridge. No.

E 22. Does the supreme governing body actually determine the administration of the service, or does it simply ratify suggestions of the executive officer?

Municipalities.

Chicopee, Westfield. ——————

Danvers. A. Yes, governing body determines. P. It simply ratifies the suggestions of executive officers.

Holyoke. A. The manager exercises large discretion. P. Both combined in one.

Marblehead. Works in unison with manager.

North Attleboro. A. Board determines. P. Usually the latter.

Peabody. P. Ratifies his suggestion.

Taunton. A. The manager is largely in control.

Companies.

Abington and Rockland. A. The division of authority between the directors and Stone & Webster is not known.

Attleboro. A. Defer much to manager.

Beverly. P. The latter.

Fitchburg. A. Largely ratify the manager.

Gardner. A. Often follow suggestions of treasurer. P. The latter.

Northampton. A. Directors accept many suggestions of manager.

Salem. A. Suggestions of manager carry much weight.

Uxbridge and Northbridge. A. Ratifies many suggestions of manager.

E 23. How is the chief executive officer (or officers, if more than one of equal rank) selected?

Municipalities.

Chicopee, Taunton. By the mayor.

Danvers. A. By the municipal light board. P. Only one, selected and appointed by the municipal light commissioners.

Holyoke. A. By the mayor. P. Appointed by the mayor; the superintendent. by the manager.

Marblehead, North Attleboro, Peabody. By the municipal light board.

Westfield. By the selectmen.

Companies.

Abington and Rockland. A. Probably by the directors.

Attleboro, Salem. A. By the directors.

Beverly. P. By the stockholders annually.

Fitchburg. A. As treasurer, by stockholders; as manager, by directors.

Gardner. A. By the stockholders. P. At annual meeting of stockholders.

Northampton. A. Manager selected by directors.

Uxbridge and Northbridge. A. As treasurer, by stockholders; as manager, by directors.

E 24. How is he removed or discharged?

Municipalities.

Chicopee. A. At the end of his term, or by the mayor for cause. P. By mayor.

Danvers. A. By the municipal board. P. By the same body (E 23).

Holyoke. A. Goes out at end of term, or may be removed for cause. P. Same authority (E 23).

Marblehead. By the municipal light board.

North Attleboro. A. At end of his term, or by board for cause. P. By the same authority (E 23).

Peabody. A. By the municipal light board for cause. P. Same body (E 23).

Taunton. A. Can be removed only for misconduct during term. P. Same authority (E 23).

Westfield. A. At end of term, or by selectmen for cause. P. Same authority (E 23).

Companies.

Abington and Rockland. A. Probably by directors.

Attleboro, Northampton, Salem. A. By directors.

Beverly. P. Same authority (E 23).

Fitchburg, Uxbridge and Northbridge. A. By the directors.

Gardner. A. By directors. P. By stockholders.

E 25. Do political considerations influence appointment or removal?

Municipalities.

Chicopee. P. Apparently not.

Danvers, Marblehead. No.

Holyoke. A. Probably not. P. Not as yet.

North Attleboro. A. Probably not. P. No.

Peabody. A. No. P. They have not.

Taunton. A. They have not thus far. P. No.

Westfield. P. No.

Companies.

Attleboro, Fitchburg, Gardner, Salem, Uxbridge and Northbridge. A. No.

No other answers.

E 26. What is his term of office?

Municipalities.

Chicopee, Holyoke. P. One year.

Danvers. A. One year. P. No stated term.

Marblehead. A. Has been four years, one year, three years, three years in different cases. P. No stated term. One man four years, one man less than a year, one man three years, one man three years, and is now the present incumbent.

North Attleboro, Peabody. One year.

Taunton. A. Three years. P. One year.

Westfield. A. Fixed by selection. P. Year to year.

Companies.

Attleboro, Uxbridge and Northbridge. A. One year.

Fitchburg, Gardner. One year.

Northampton. ————

Salem. A. No definite term.

E 27. Has he changed with each change in the city administration?

Municipalities.

In every case this question is answered by "No," or left unanswered, except that for *Taunton* Mr. Prichard answers "Once," and for *Danvers* Mr. Prichard answers, "No, one man 12 years, one man 5 years, one man since December, 1905."

Companies.

In a few instances the question is answered by "No." In other cases it is left unanswered.

E 28. How long has the present incumbent served?

Municipalities.

Chicopee. A. Some years.

Danvers. A. One year. P. Since December, 1905.

Holyoke. A. Since the city bought the plant in 1902. P. Since the plant started, December 15, 1902.

Marblehead. Three years.

North Attleboro. A. Since 1894. P. 13 years, ever since started.

Peabody. A. Three to four years. P. Four years.

Taunton. A. Since a date prior to 1901. P. Six years.

Westfield. P. Seven years.

Companies.

Abington and Rockland. A. Since March 23, 1896. P. Ten years.

Attleboro, Northampton. ————

Beverly. P. About twenty years.

Fitchburg. A. Probably about fifty years. P. Since 1852.

Gardner. P. Since organization of company.

Salem. A. Nearly 16 years.

Uxbridge and Northbridge. A. Since 1899.

E 29. Does he devote all his time to the business?

Municipalities.

Yes; for all except:

North Attleboro. A. No, is engineer of town water department. P. Also engineer of pumping station.

Peabody. No.

Companies.

Abington and Rockland, Fitchburg. P. Yes.

Attleboro, Salem. A. Yes.

Beverly. P. Mostly.

Gardner. No.

Northampton, Uxbridge and Northbridge. ————

E 30. What was his annual salary or pay for last fiscal year?

Municipalities.

Chicopee, Peabody. $1,200.

Danvers. A. $1,150. P. $1,200.

Holyoke. A. $4,000, charged equally to gas and electric departments. P. $4,000.

Marblehead. A. $18 per week. P. $936.

North Attleboro. A. $800 as manager of electric plant. P. $800 per year for municipal light, and $800 per year for pumping station.

Taunton. $1,800.

Westfield. A. $1,546.27, charged equally to gas and electric departments. P. $1,500.

Companies.

Abington and Rockland. A. Unable to state compensation of Stone and Webster. P. $1,500.

Attleboro. A. $2,000.

Beverly. $2,900.

Fitchburg. A. $5,000, charged one-half to gas business. P. $5,000.

Gardner. $800.

Northampton. $1,500.

Salem. A. Not stated.

Uxbridge and Northbridge. A. $300.

E 31. Give titles and salaries of the ten highest paid subordinates of the chief executive officer for the last fiscal year.

Municipalities.

Chicopee. (See G 6.)

A. Average number (true average unknown; the figures given represent the usual numbers of persons employed at each plant):

	Per Month.
Three engineers	$75.00
Three firemen	60.00
Three construction men	64.74
Three lamp trimmers	56.25
Total, 12.	

Danvers. (See G 6.)

A. Average number:

One chief engineer	$91.00
Two firemen	60.67
One second assistant engineer	69.33

	Per Month.
One assistant engineer	$75.83
One lamp trimmer and lineman	75.83

Total, 6.

P. None such.

Holyoke. (See G 6.)

A. The electrical superintendent was paid $2,500 per year. Average number for year:

Three engineers	$97.00
Four firemen	68.25
Two meter readers	64.45
One foreman	100.00
Three dynamo tenders	83.33
Five linemen	70.20
Seven lamp trimmers	68.25
Three oilers	68.25

Total, 28.

P. Superintendent electric department	$2,500.00
Superintendent gas department	2,000.00
Chief clerk	1,800.00

Marblehead. (See G. 6.)

A. Average number for year:

Two engineers	$75.83
Two firemen	60.66
Two linemen, one $70.00; the other	72.00
Two linemen	63.00

Total, 8.

P. None.

North Attleboro. A. One-half of the wages of the engineers and firemen were charged to the water department, and only one-half appears here. (See G 6.)

Average number for year:

One first engineer	$37.50
One second engineer	30.00
One fireman	40.00
One clerk	45.83
One assistant	52.00
One electrician	90.00

Total, 6.

P. None.

Peabody. (See G 6.)

A. Average number for year:

One chief engineer	$82.33
Two assistant engineers	73.66 2/3
Two firemen	60.66 2/3
One lineman	69.33
One lineman	52.00
Two lamp trimmers	66.66
One trimmer, part of the time	17.33

Total, 10.

P. None such.

Taunton. (See G 6.)

A. Average number for year:

	Per Month.
One engineer	$84.00
Three engineers	68.00
Three firemen	56.00
One electrician	70.00
Six dynamo tenders	64.00
One lineman	60.00
One lamp trimmer	60.00
One bookkeeper	76.00
Total, 17.	

P. Bookkeeper at $1,000 per year.

Westfield. (See G 6.)

A. Average number for year:

Three engineers	$71.00
One fireman	52.00
One lineman	65.00
One lamp trimmer	45.00
Total, 6.	

One-half of superintendent's time is charged to this department.

P. Are none.

Companies.

Abington and Rockland. (See G 6.)

A. Average number for year:

	Per Week.
One chief engineer	$21.00
Two engineers and firemen	17.50
One fireman	16.50
One foreman	19.00
Two linemen	15.00
One helper and lamp trimmer	10.00
Total, 8.	

Superintendent receives $1,500 per year.

Attleboro. (See G 6.)

A. Superintendent gets $2,000 per year. Average number for year:

Three engineers, maximum rate per week	$24.50
Minimum rate per week	21.00
Three firemen, maximum rate per week	15.00
Minimum rate per week	12.00
Two linemen, maximum rate per week	20.00
Minimum rate per week	14.00
One lamp trimmer	16.00
Total, 9.	

Beverly. (See G 6.)

P. Superintendent of electric department	$1,900.00
Superintendent of gas department	1,200.00

Fitchburg. (See G 6.)

Average number for year:

		Per Week.
One chief engineer		$30.00
Three assistant engineers		20.00
Three firemen		15.00
Three oilers		15.00
One inspector		17.00
Two electricians	30.00 and	20.00
Three linemen	15.00 to	18.00
One lamp trimmer		15.00
One helper		15.00
One repairer, arc lamps and meters		18.00
Two coal handlers	10.50 to	12.00
Total, 21.		
P. Superintendent of electricity		$2,500.00

Gardner. (See G 6.)

A. Average number for year:

Three engineers	$14.00 to	$25.00
Two firemen		12.25
One meter reader and general care		9.00
One electrician		18.50
One lineman		12.00
Total, 8.		

P. No salaried men.

Northampton. (See G 6.)

A. Assistant manager, $1,320. Other salaries and wages refused.

Salem. (See G 6.)

A. One general manager		......
One superintendent	per mo.	$100.00
One assistant superintendent	per mo.	100.00
		Per week.
One chief engineer		28.85
Three engineers		18.00
Three firemen		14.00
One engine cleaner		......
One coal passer		......
One machinist		......
One janitor		......
Three switchboard attendants	14.00 to	16.50
One foreman of inside wiring		......
Nine interior wiremen	9.00 to	15.00
Two meter repairmen		......
Two trimmers of arc lamps		14.00
Two stockmen		......
One night patrolman		15.00
One foreman of linemen		......
Five linemen	12.00 to	16.50
One hostler and teamster		......
Two helpers and painters		......
One solicitor and collector		......

	Per Week.
One bookkeeper	......
Three clerks	......
One clerk and asst. stockman at station	......

Total, 49.

Uxbridge and Northbridge. (See G 6.)

A. Average number for year:

Three engineers; maximum wages	$21.00
Minimum wages	16.50
Two firemen; maximum wages	14.00
Minimum wages	12.50
One clerk	15.00
Three linemen and trimmers; maximum wages	15.00
Minimum wages	13.00
One superintendent at, per year	1,200.00

Total, 10.

E 32. Give number of salaried officers during last fiscal year. (a) Total. (b) Average. (Where total and average are the same, only one answer is given.)

Municipalities.

Chicopee, Taunton. 1.

Danvers, North Attleboro. 4.

Holyoke. A. 2. Manager and electrical superintendent. P. 4.

Marblehead. 2.

Peabody. One.

Westfield. A. 1. P. 2.

Companies.

Abington and Rockland. A. 2. P. 1.

Attleboro, Northampton, Uxbridge and Northbridge. A. 2.

Beverly. 1.

Fitchburg. A. Two in electric department. P. 2.

Gardner. 1.

Salem. A. 5.

E 33. How are the subordinate officials and employees selected?

Municipalities.

Chicopee. A. By manager under direction of the mayor. P. By manager.

Danvers. A. By Board and manager. P. By manager.

Holyoke. A. Mainly by manager. P. By manager.

Marblehead. A. By board and manager. P. By manager, with approval of municipal light board.

North Attleboro. A. By municipal light board and the manager. P. By manager.

Peabody, Taunton. By manager.

Westfield. A. By manager under the direction of selectmen. P. By manager.

Companies.

Abington and Rockland. A. By superintendent. P. By manager.

Attleboro, Northampton. A. By manager.

Beverly. P. By manager and superintendents of departments.

Fitchburg. A. By manager and superintendent. P. By manager.

Gardner. A. By treasurer, who is also manager. P. By manager.

Salem. A. The manager selects superintendent, assistant superintendent and foreman, and these latter employ the other men.

Uxbridge and Northbridge. A. The manager selects the superintendent, and the superintendent selects the men under him.

E 34. How and by whom are they discharged?

Municipalities.

All, "By the manager," except:

Marblehead. A. By board. P. By same process (E 33).

Companies.

Abington and Rockland. A. By superintendent. P. By manager.

Attleboro. A. By manager.

Beverly. P. By manager and superintendents of departments.

Fitchburg. A. By manager and superintendent. P. By manager.

Gardner. A. By treasurer. P. By manager.

Northampton. ————

Salem. A. By the persons who employ them.

Uxbridge and Northbridge. A. In the same way as they are selected.

E 35. What positions are filled for definite terms?

Municipalities.

All. A. That of manager. P. None, except:

Holyoke. A. ————. P. Manager only.

Marblehead. None.

Companies.

All, "None," except:

Attleboro. A. That of manager.

Salem. A. Only that of president and treasurer.

Uxbridge and Northbridge. A. Superintendent employed on yearly contract.

E 36. Who decides when and how many men are to be employed?

Municipalities.

Chicopee. A. The manager under direction of the mayor. P. The manager.

Danvers. A. The board and manager. P. The municipal light board.

Holyoke, Peabody, Taunton. The manager.

Marblehead, North Attleboro. A. The board. P. The manager.

Westfield. A. Selectmen and manager. P. Manager, subject to approval of selectmen.

Companies.

Abington and Rockland. A. Managers and superintendent. P. Manager.

Gardner. A. Treasurer. P. Manager.

Uxbridge and Northbridge. A. Manager and superintendent.

All others, "Manager."

E 37. What is the usual length of service?

Municipalities.

Chicopee, Taunton. A. Indefinite; few changes. P. During efficient service.

Danvers. A. Indefinite. P. No stated term.

Holyoke, Westfield. A. Few changes. P. During efficient service.

Marblehead. Few changes.

North Attleboro. A. Indefinite; few changes. P. Good behavior.

Peabody. A. Several years at least. P. During competent service.

Companies.

Abington and Rockland, Fitchburg. A. Few changes. P. During efficient service.

Attleboro, Salem. A. Few changes.

Beverly. P. During efficient service.

Gardner. A. Few changes. P. During satisfactory service.

Northampton. ———————

Uxbridge and Northbridge. A. Superintendent in position four years.

E 38. What is the system of promotion?

Where this question is answered at all, the answer is that there is no system of promotion.

E 39. What considerations determine (a) Selection, (b) Dismissal?

Municipalities.

Chicopee. A. (a) Wages and fitness; (b) quality of work. P. (a) General adaptation to the work; (b) incompetency.

Danvers. A. (a) Fitness; (b) lack of work or unsatisfactory work. P. (a) General fitness; (b) general unfitness.

Holyoke. A. (a) Fitness; civil service rules apply to clerical force, superintendent and foreman; (b) lack of work or unsatisfactory service. P. (a) General adaptability; (b) general inefficiency.

Marblehead. A. (a) Fitness; (b) lack of work or unsatisfactory service. P. None.

North Attleboro. A. (a) Wages demanded and fitness; (b) quality of work. P. (a) General fitness; (b) general inefficiency.

Peabody. A. (a) Wages and fitness; (b) unsatisfactory work. P. (a) General fitness; (b) incompetency.

Taunton. A. (a) Wages and fitness for the work; (b) unsatisfactory work. P. (a) General fitness; (b) unsuitability.

Westfield. A. (a) Wages and fitness; (b) quality of work.

P. (a) General fitness; (b) general incapability.

Companies.

Mr. Adams' answers indicate that wages and ability determine selection, and the quality of the work, dismissal. Mr. Prichard gives general suitability for (a); general inefficiency for (b).

E 40. Is employment restricted to citizens?

Municipalities.

Chicopee, Marblehead. No.

Danvers. A. No. P. If available.

Holyoke. A. Usually. P. Yes; by city ordinance.

North Attleboro. A. No. P. No; citizens are given preference.

Peabody. A. In fact, yes. P. No.

Taunton. Not necessarily, but all regular employees are citizens. P. No; but they are favored.

Westfield. A. Not necessarily. P. No.

Companies.

Abington and Rockland, Fitchburg, Gardner. A. Not necessarily. P. No.

Attleboro. A. Not necessarily.

Beverly. P. No.

Northampton, Salem. No.

Uxbridge and Northbridge. A. No.

E 41. Are there any age restrictions?

The answers indicate that there are no restrictions in any case.

E 42. Are residents of the town given the preference?

Municipalities.

Chicopee, Westfield. A. Usually. P. Yes.

Danvers. A. Not necessarily. P. Yes.

Holyoke. P. Yes.

All others, "Yes."

Companies.

All, "Yes," except:

Attleboro. A. All are residents.

Beverly. P. Yes.

Fitchburg. A. All are residents. P. Yes.

Salem. A. Yes; other things being equal. P. Yes.

Uxbridge and Northbridge. A. No.

E 43. Are positions distributed among the needy?

Where this question is answered at all, it is answered by "No."

F—POLITICAL CONDITIONS.

F 1. What are the conditions of municipal suffrage?

F 2. Give the number of votes cast at the last city election, and date of election.

In no instances are these questions answered, except that Mr. Adams answers for F 1, *Taunton*, "Fixed by state law"; for F 2, *Danvers*, "1,478 votes"; and Mr. Prichard answers for F 1, *Danvers*, "State laws"; F 2, *Danvers*, "March meeting." Mr. Prichard states that "F" does not apply to *Salem*.

F 3. How many of the employees are voters?

Municipalities.

Chicopee. P. Thirteen in number.

Danvers. A. 5. P. Five out of 7 employees, the other two voting out of town.

Holyoke. P. Majority.

Marblehead. Nine out of 10.

North Attleboro. All.

Peabody. A. All. P. All; 10.

Taunton. P. All; 18.

Westfield. P. All; 10.

Companies.

Abington and Rockland. ———————

Attleboro, Uxbridge and Northbridge. A. All.

Beverly. P. All; 12.

Fitchburg. P. All.

Gardner. A. Nearly all. P. 6.

Northampton. A. Nearly all. P. All.

Salem. A. Nearly all.

F 4. If any employees hold city office, state how many and what positions?

Municipalities.

Chicopee, Taunton, Westfield. P. None.

Danvers, Marblehead, North Attleboro. None.

Holyoke. A. No employees hold city office. P. One alderman.

Peabody. A. Bookkeeper holds office of town auditor. One engineer is a member of the municipal light board. P. One engineer is a member of the municipal light board.

Companies.

Abington and Rockland, Salem, Uxbridge and Northbridge. A. None.

Attleboro. A. Manager is town inspector of wires.

Beverly. P. None.

Fitchburg, Northampton. ———————

Gardner. A. Steam engineer is engineer of the town fire department.

F 5. Have the votes of employees affected city elections?

Where this question is answered at all, it is answered by the word, "No," with the exception of Mr. Adams' schedule for *Gardner*, which is answered, "Probably not."

F 6. Have they used political power to secure higher wages, fewer hours, etc.? Cite instances.

Where this question is answered at all, it is answered, "No," except that Mr. Pritchard answers for *Danvers*, "Not recently."

F 7. Have candidates for office promised higher wages, better hours, etc., for employees? Cite cases.

This question, where answered at all, is answered by "No," except as follows:

Chicopee. A. Not with practical effect.

Holyoke. A. If such promises have been made they have never had any practical effect upon wages.

Fitchburg, Gardner. A. Probably not.

F 8. Are employees active in party work?

This question is rarely answered. In answering, answer is "No," except *Fitchburg* and *Salem,* "Probably not."

F 9. Are they expected or required to pay political assessments?

This question, where answered at all, is answered by the word "No," except that for *Beverly,* Mr. Prichard answers, "Does not apply."

F 10. What evidence is there of the influence of private companies upon the nomination and election of members of the franchise granting and franchise controlling authorities?

Where this question is answered at all, it is answered by "None," or "None found."

F 11. To whom has free service been given?

Municipalities.

The answers indicate that no free service is given except in *Peabody.*

Peabody. A. Two engineers of water department that live in buildings owned by the town. P. All town buildings, which includes two houses which are occupied by the engineers of the water department.

Companies.

Abington and Rockland. A. Only to the superintendent. P. The manager.

Attleboro. A. Only to the manager for lighting his house.

Beverly. P. The manager and superintendents of gas and electrical departments.

Fitchburg, Gardner, Northampton. None.

Salem. A. To no one except the city, and this free service appears to be in fact a part of the consideration for the money paid by the city for lighting.

Uxbridge and Northbridge. A. None.

F 12 to F 22, all relating to the granting of free services to the municipal plants, do not apply, in view of the answer to F 11, except to the plant at *Peabody.* These questions are not answered for any private plant.

Peabody. The answers for Peabody indicate that the free service goes with the position of engineer, has been and is confined to the two engineers, is generally publicly known, and amounts, according to Mr. Prichard, to a total of about $50 per year.

G—LABOR.

G 1. The following data are for the year ending June 30, 1906.

G 2. What was the total number of all officers, clerks and employees for the last fiscal year?

Municipalities.

Chicopee. P. 13 throughout the fiscal year.

Danvers. P. January 1 to December 1, 1905, inclusive, 11.

Holyoke. ——————

Marblehead. P. January 1 to April 1, 1905, inclusive, 10; May 1 to November 1, 1905, inclusive, 12; December 1, 1905, 10.

North Attleboro. A. 6 throughout the year 1906.

Peabody. P. 12 throughout the fiscal year.

Taunton. P. 18 throughout the fiscal year.

Westfield. P. January 1 to June 1, 1906, 8 E (Electricity?); July 1, 1905, to June 1, 1906, 8 G (Gas?).

Companies.

Abington and Rockland. A. 14. P. 9 for all dates except June 1, 1906, which is 10.

Attleboro. P. 12 throughout the fiscal year.

Beverly. P. Electrical department, 12, July 1, 1905, to March 1, 1906, inclusive; 13, April 1 to June 1, 1906, inclusive.

Fitchburg. A. 21 for electric department.

Gardner. A. 11. P. 10 throughout the fiscal year.

Northampton. A. 19.

Salem. A. 51. P. 51 throughout the fiscal year.

Uxbridge and Northbridge. A. 14.

G 3. What were the dates of elections?

Municipalities.

The only dates given are:

Danvers. P. March of each year.

Peabody. P. No elections, excepting manager, April, each year.

Companies.

The only dates given are:

Gardner. P. Manager only, July each year.

Salem. P. Annually for officers; none for others.

G 4. What was the average number for the year?

G 5. What was the average number of wage-workers for the year?

A. True average unknown; the figures given are believed to represent the usual numbers of officers and persons regularly employed.

Municipalities.

	A.		P.	
	(G 4)	(G 5)	(G 4)	(G 5)
Chicopee	13	12	13	12
Danvers	10	6	11	7
Holyoke	29	28	..	..
Marblehead	12	8	11 1-6	9 1-6
North Attleboro	10	6	6	6
Peabody	13	10	12	10
Taunton	18	17	18	16
Westfield	10	6	8	6

Companies.

	A.		P.	
	(G 4)	(G 5)	(G 4)	(G 5)
Abington and Rockland	14	8	9½	8½
Attleboro	12	9	12	11

	A. (G 4)	A. (G 5)	P. (G 4)	P. (G 5)
Beverly	12	10[1]	12¼	11¼
Fitchburg	24	21[1]	..	..
Gardner	11	8	10	9
Northampton	18	16	..	..
Salem	51	49	51	46
Uxbridge and Northbridge...........	14	10		

G 6. Wages paid.

Municipalities.

Chicopee. P. Average.

	Maximum, per day.	*Minimum, per day.*	*Usual wage, per week.*
3 Engineers	$3.00	$2.15	$15-17-21
3 Firemen	2.00	2.00	14
3 Linemen	3.00	2.00	12-15-18
3 Lamp trimmers..	2.40	2.00	14-16.75
12			

A. Answered under E 31.

Danvers. P. Average.

	Maximum, per week.	*Minimum, per week.*	*Usual wage, per week.*
3 Engineers	$21.00	$14.00	$21-17.50-14
2 Firemen	14.00	14.00	14
1 Collector (also town clerk)	(per year)		175
1 Lamp trimmer.......	(including horse)		17.30
7			

A. Answered under E 31.

Holyoke. P. Average.	*Usual wages per month.*
3 Engineers	$97.00
4 Firemen	68.25
2 Meter men............................	64.45
1 Inspector	100.00
3 Dynamo tenders........................	83.33
5 Linemen	70.20
7 Lamp trimmers........................	68.25
3 Oilers	68.25
28	

---

[1] Electric plant only.

Gas Department.	*Per month.*
2 Foremen, street	$78.00
4 Foremen, works	85.31
3 Inspectors and complaint men	76.91
21 Stokers	52.00

A. Answered under E 31.

Marblehead. P. Average.	*Per day.*
2 Engineers	$2.50
2 Firemen	2.00
1 Meter reader	2.25
1 Collector (also clerk of water board) per wk.	7.00
2 Linemen—	
One	2.00
One	2.25
2 Lamp trimmers (per day each)	2.00
10	

A. Answered under E 31.

North Attleboro. P. Average.	*Per month.*
2 Engineers (½ of wages paid by water works)—	
One	$37.50
One	30.00
1 Fireman ($20 paid by water works)	40.00
1 Inspector	90.00
1 Collector and bookkeeper ($15.83 paid by water works)	45.83
1 General utility man	52.00
6	

A. Answered under E 31.

Peabody. P. Average.	
3 Engineers—	
One	$82.33
Two	73.66
2 Firemen	60.66
2 Linemen—	
One	69.33
One	52.00
3 Lamp trimmers—	
Two (each)	66.66
One (in part)	17.33
10	

A. Answered under E 31.

Taunton. P. Average.	
4 Engineers—	
One	$84.00
Three	68.00
9 Firemen	56.00
1 Inspector	70.00

		Per month.
6	Dynamo tenders	$64.00
1	Lineman	60.00
1	Lamp trimmer	60.00
16		

A. Answered under E 31.

Westfield. P. Average.

		Maximum, per week.	*Minimum, per week.*	*Usual wages, per week.*
3	Engineers	$21.00	$15.00	$15-15-21
1	Fireman	....	....	12
				Per month.
1	Lineman			$65.00
1	Lamp trimmer			45.00
6				

Gas Department.

1	Foreman	$80.00
4	Stokers	65.00
3	Helpers	40.00
8		

A. Answered under E 31.

Companies.

Abington and Rockland. P. Average.

		Per week.
3	Engineers—	
	One	$20.00
	Two	16.50
2	Firemen	15.00
3	Linemen and lamp trimmers—	
	One	18.00
	One	15.00
	One	12.00
1	Bookkeeper (part time only)	2.00
9		

A. Answered under E 31.

Attleboro. P. Average.

		Per day.
3	Engineers	$3.00
3	Firemen	2.25
2	Linemen—	
	One	3.00
	One	2.50
1	Lamp trimmer and inspector	2.50
1	Bookkeeper	3.00
1	Clerk per wk.	10.00
11		

A. Answered under E 31.

Beverly. P. Average.

	Per week.
3 Engineers	....
2 Firemen	$14.00
1 Meter reader	12.00
1 Dynamo tender and switchboard man	16.00
3 Linemen	16.50
1 Lamp trimmer	14.00
2 Bookkeepers—gas and electricity—	Per year.
One	$884.00
One	520.00
13	

Gas Employees.

	Per week.
Foreman	$15.75
Stokers	14.00
Yardman	14.00
Street men	14.00
Stockkeeper	15.00

A. Average for the year. 3 engineers, 2 firemen, 1 dynamo tender, 2 linemen, 1 electrician, 1 lamp trimmer. Total, 10.

Fitchburg. P. Average. 4 engineers, 3 firemen, 1 inspector, 1 meter man, 3 dynamo tenders, 4 linemen, 1 lamp trimmer, 2 laborers, 2 electricians. Gas employees: 1 foreman (general), 2 retort house foremen, 6 stokers, 7 setting stoves and meters, 1 carpenter and painter, 1 street foreman, 1 assistant street foreman, 15 laborers on street, April to September, inclusive; 3 laborers on street, October to March, inclusive; 6 laborers at works, all the year.
A. Answered under E 31.

Gardner. P. Average.

	Per day.	Per. week.
3 Engineers—		
One	$2.50	
One		$25.00
One	2.00	
2 Firemen	1.75	
1 Electrician	...	18.50
1 Meter reader and general man	2.00	
1 Lineman	2.00	
1 Bookkeeper	...	8.00

A. Answered under E 31.

Northampton. P. 3 engineers, 3 firemen, 2 linemen, 1 lamp trimmer, 4 wiremen, 1 lamp repair man, 1 office boy. A. Average. 1 superintendent, 1 engineer, 2 assistant engineers, 3 firemen, 1 office boy, 1 arc lamp repairer, 1 lineman, 1 helper for lineman, 1 lamp trimmer, 2 wiremen, 2 helpers for wiremen. Total, 16. Officers refused to give rate of wages.

Salem. P. Average.

	Per week.	*Minimum, per week.*
4 Engineers—		
One	$28.85	$18.00
Three	18.00	
3 Firemen	16.00	
1 Inspector	15.00	
2 Meter men	12.00	
1 Collector	15.00	
10 Wiremen—		
One	20.00	
	Per day.	
Nine from $1.00 to	2.75	
3 Stock keepers—		
One	2.50	
Two	2.00	
3 Switchboard men—		
One	2.00	
One	2.20	
One	2.75	
6 Linemen—	*Per week*	
Two	16.50	
Two	15.00	
One	13.50	
One per day	2.00	
Minimum wages per day	...	2.00
Usual wages per day	2.00	2.75
2 Lamp trimmers per wk.	10.50	
4 Bookkeepers—		
One per month	100.00	
One per month	50.00	
One per wk.	6.00	
One per wk.	7.00	
7 Laborers (per wk.) $10.50 to	14.00	

A. Answered under E 31.

Uxbridge and Northbridge. A. Answered under E 31.

G 7. Legal maximum of hours of labor.

Municipalities.

Chicopee, Holyoke, Peabody, Westfield. P. 8.
Danvers, Taunton. 8.
Marblehead. No maximum.
North Attleboro. A. None. P. 9 hours for electric and 8 hours for others.

Companies.

Where this question is answered the answer indicates that there is no maximum for companies, except that for *Abington* and *Rockland* Mr. Prichard answers, "State law," and for *Fitchburg,* "8 hours."

G 8. Hours of actual work.

Municipalities.

Chicopee. P. 8 per day, 56 per week, for engineers, firemen, linemen, lamp trimmers.

Danvers. A. 8 per day for all employees. P. 8 per day, 56 per week, for engineers, firemen, collectors, lamp trimmers.

Holyoke. A. 8 per day for all employees. P. 8 per day for all employees, 56 per week for engineers and firemen.

Marblehead. A. 9 hours per day for all employees. P. Cannot give, as no regular hours are observed.

North Attleboro. A. Usually 8 to 10.

		Per day.	*Per week.*
P.	Engineers and firemen	8	56
	Inspectors	9	63
	Collectors	9	54
	General utility	10	60

Peabody. P. 56 per week for all employees.

Taunton. A. 8 hours per day for all employees.

		Per day.	*Per week.*
P.	Engineers, firemen and dynamo tenders	8	56
	Inspectors, linemen and lamp trimmers	8	48

Westfield. P. Engineers, 8; firemen, 8 to 10; linemen, 10; lamp trimmers, 9½.

Companies.

	A.	P.	
Abington and Rockland.	*Per day.*	*Per day.*	*Per week.*
Engineers	10	9	63
Firemen	10	10	70
Linemen and lamp trimmers	9	9	54
Bookkeeper by the hour.			

	A.	P.	
Attleboro.	*Per day.*	*Per day.*	*Per week.*
Engineers and firemen	12	12	78
Linemen and lamp trimmers	10	..	..
Bookkeeper and clerk	..	9	54
Lineman, inspector and lamp trimmer	..	10	70

Beverly. P.

	Per day.	*Per week.*
Engineers—		
One	10½	75
Two	9	63
Firemen	10	70
Dynamo tenders and switchboard man	9	63
Linemen, lamp trimmers and meter readers	9	54

Fitchburg. A. Engineers and firemen, 8; linemen and lamp trimmers, 9; laborers, 10.

Gardner. A. 10 per day. P. 10 per day for all; 70 per week for engineers and firemen, 60 for electrician, linemen, and meter readers and general

Northampton. A. 8 per day for all except inspectors, meter readers, linemen and laborers, who work 9.

	A.	P.	
Salem.	*Per day.*	*Per day.*	*Per week.*
Engineers	8	8	56
Firemen	8	8	56
Inspectors	10	10	70
Meter readers	9	9	54
Collectors	9	9	54
Dynamo tenders	8	..	..
Switchboard man	8	8	56
Linemen	9	9	54
Lamp trimmers	9	9	54
Laborers	..	..	..
Laborers and others	..	8	56
10 Wiremen	..	9	54
2 Stockkeepers	..	9	54

Uxbridge and Northbridge. A. 10 per day for engineers, firemen, linemen and lamp trimmers.

G 9. How was overtime paid for?

	A.	P.
	Municipalities.	
Chicopee		Pro rata.
Danvers	Single time	No overtime.
Holyoke	1½ regular wages for overtime	1½ regular wages for overtime.
Marblehead	No payment	No overtime payment.
North Attleboro	At the regular rate	Don't have overtime.
Peabody	Regular time rates	Pro rata.
Taunton	No overtime	No overtime.
Westfield		None.
	Companies.	
Abington and Rockland		Pro rata.
Attleboro	No overtime paid for	None.
Beverly		Pro rata.
Fitchburg	No overtime and no lost time	No overtime and no lost time.
Gardner	At regular rate	Pro rata.
Northampton	At regular rate	Time and one-half.
Salem	1½ regular rates for overtime	Time and a half for outside men. Inside men pro rata.
Uxbridge and Northbridge	No overtime paid for	

G 10. State what vacation, including holidays with pay, was allowed to wage-workers.

	Municipalities.	
Chicopee		One week per year.
Danvers	None	None.
Holyoke	One to two weeks	Switchboard men (3) two weeks with pay. No others.
Marblehead	One week each year	One week.
North Attleboro	Ten days to 2 weeks per year.	One to two weeks, according to circumstances.

	A.	P.
Peabody	One week	One week and legal holidays, if convenient.
Taunton	One to two weeks	None.
Westfield		One week.

Companies.

Abington and Rockland	Inside men 14 days	Engineers, 2 weeks; firemen, 2 weeks; foreman of linemen, 2 weeks.
Attleboro	One week	One week vacation and legal holidays.
Beverly		None.
Fitchburg	None, except to persons in the office and the superintendent, two weeks.	No vacation.
Gardner	No definite time	Chief engineer, electrician and bookkeeper, 2 weeks.
Northampton	Ten days	All station help have one week with pay.
Salem	None	7-day men work holidays, no vacation. 6-day men do not work holidays. No vacation.
Uxbridge and Northbridge	Seven days	

G 11. State what vacation, with pay, was allowed to salaried employees.

Municipalities.

	A.	P.
Chicopee Westfield		One week.
Danvers	None	None.
Holyoke	One week	Each entitled to 2 weeks.
Marblehead	One week	One week.
North Attleboro	Ten days to 2 weeks	One to two weeks, according to circumstances.
Peabody	One week	Never have taken one.
Taunton	One to two weeks	Two weeks.

Companies.

Abington and Rockland	14 days	Two weeks.
Attleboro	None usually taken	Legal holidays and 2 weeks.
Beverly		Two weeks.
Fitchburg	Superintendent, 2 weeks	Two weeks.
Gardner	No definite time	Two weeks.
Northampton	Two weeks	None.
Salem	No regular time, but salary usually goes on	Two weeks.
Uxbridge and Northbridge	14 days	

G 12. State what allowance was made to wage-workers for sick leave.

Municipalities.

Chicopee		Temporary illness, no loss of pay.
Danvers	None	None.

	A.	P.
Holyoke	No regular rule	Foremen are allowed sick leave without loss of pay.
Marblehead	Pay goes on when sick.	Permanent man receives his pay when sick.
North Attleboro	Pay usually goes on	Temporary sickness, regular monthly men are paid in full.
Peabody	No allowance	No allowance.
Taunton	Wages go on for reasonable time	No loss of pay for temporary sickness.
Westfield		One week.

Companies.

	A.	P.
Abington and Rockland	Pay goes on during short sickness	Engineers and firemen and foremen of linemen, no loss of pay. Others are subject to loss of pay.
Attleboro	Wages usually go on	Full wages allowed.
Beverly		No loss of pay.
Fitchburg	Wages usually go on	No loss of pay.
Gardner	Wages of electrician and chief engineer go on	None.
Northampton	Pay continues during short illness	No loss of pay for temporary illness.
Salem	Pay during sickness goes on during short time only	No allowance.
Uxbridge and Northbridge	Pay goes on during short illness	

G 13. State what allowance was made to salaried employees for sick leave.

Municipalities.

	A.	P.
Chicopee		See G 12.
Danvers	Salaries go on	None.
Holyoke	Pay usually goes on	Same as foreman.
Marblehead and North Attleboro	Pay usually goes on	See G 12.
Peabody	No deduction	No sickness. Pay would not be lost.
Taunton	Wages usually go on	No loss of salary.
Westfield		One week.

Companies.

	A.	P.
Abington and Rockland, Attleboro, Salem, Gardner	Salary usually goes on.	No loss of pay.
Beverly		No loss of salary.
Fitchburg	Salary goes on	No loss of pay.
Northampton	Salary usually goes on in spite of sickness	See G 12.
Uxbridge and Northbridge	Salary usually goes on.	

G 14. In case of accident to employees, who paid medical expenses?

Municipalities.

	A.	P.
Chicopee		Paid by employees.
Danvers	No case of medical expense	The department.
Holyoke		The city.
Marblehead	The town.	Municipal light department.
North Attleboro	No accidents.	No accidents.
Peabody	The town.	The town, if not by the insurance company.
Taunton	Claim paid by insurance company	The department.
Westfield		Insurance company.

Companies.

	A.	P.
Abington and Rockland	The insurance company pays or defends claims.	The company.
Attleboro	The company is insured against damage by accident to employees.	The company.
Beverly	Company insured against damage by accidents to its men.	The company.
Fitchburg, Salem	Claims of employees are paid or contested by insurance company.	The company.
Gardner	The employees, or the insurance company.	Never had any.
Northampton	The company is protected by employers' insurance	The company.
Uxbridge and Northbridge	Except that the company gives first aid, the employee or the employers' insurance company pays.	

G 15. Who paid for badges and uniforms?

Municipalities.

	A.	P.
Chicopee		None.
Danvers, Marblehead, North Attleboro	None	None.
Holyoke	No uniforms. City pays for badges.	No uniforms. City pays for badges.
Peabody	The town, for badges.	The town for badges. No uniforms.
Taunton	None	No badges.
Westfield		Town pays for badges.

Companies.

The answers indicate that nobody pays for badges and uniforms, except:

Fitchburg. P. Company for badges.

Salem. A. No uniforms; company for badges. P. Badges only, by company.

G 16. Were employees required to give surety bonds?

Municipalities.

	A.	P.
Chicopee, Westfield		No.
Danvers	The collector	No.
Holyoke, Peabody, Taunton	Only the manager	Only the manager.
Marblehead, North Attleboro	No	No.

Companies.

Abington and Rockland	Yes, the superintendent.	Manager only.

All others. One or both investigators, no.

G 17. Who paid the premiums ?

Municipalities.

	A.	P.
Danvers	The collector	No premiums.
Holyoke	The manager	The manager.
Peabody	The town	The town.
Taunton	In part by the manager; in part by the city	The manager personally.

No other answers.

Companies.

Abington and Rockland	The company	The company.

No other answers.

G 18. What provision was made for technical instruction?

G 19. Were prizes offered for faithful service?

G 20. Describe system of profit-sharing, if any.

G 21. Describe pension system for old age or infirm employees.

G 22. Did local benefit associations exist among employees?

G 23. If there were, did municipality or company contribute to the funds?

The answers so far as these questions are concerned indicate that the matters referred to have received no attention in any of the plants, public or private.

G 24. What other methods were used by the municipality or company to improve the social welfare, such as club houses, libraries, gymnasiums excursions, toilet facilities, etc.?

Municipalities.

	A.	P.
Chicopee	Toilet	
Danvers	Toilet	None, excepting adequate toilet facilities, including shower bath at station.
Holyoke	Toilet	Customary toilet facilities.
Marblehead	None	None.
North Attleboro	Bath and toilet	None.
Peabody, Westfield	Toilet	None.
Taunton	Toilets	Proper sanitary and toilet facilities.

Companies.

Abington and Rockland	Toilet and bath	Lockers, bath tub and usual facilities.

	A.	P.
Attleboro	Toilet and bath........	Ample toilet facilities.
Beverly	....	Ample toilet facilities.
Fitchburg	Toilets	Adequate toilet facilities. Bath house to be constructed next year.
Gardner, Northampton	Toilets	None.
Salem	Toilets and bath; technical papers.........	Technical books are provided and full toilet facilities.
Uxbridge and Northbridge	Toilets	

G 25. Did employees get free service or gratuities of any sort? If so, what?

Municipalities.

A. P.

The answers indicate that no free service or gratuities were given to employees.

Companies.

	A.	P.
Abington and Rockland	Light at less than regular rates............	Employees are charged $1.00 per month for a maximum use of $5.00 at regular rates. Manager free.
Attleboro	$5.00 at Christmas, and a turkey at Thanksgiving	$5.00 at Christmas and a turkey at Thanksgiving.
Beverly	....	Superintendents of Gas and Electric Light Departments
Fitchburg	None	Free coke and no lost time.
Gardner	Yearly gift of $5.00....	$5.00 as a Christmas present.
Northampton, Salem,	None	None.
Uxbridge and Northbridge	None	

G 26. How frequently were different classes of employees paid?

Municipalities.

Weekly for all except *North Attleboro*, semi-monthly.

Companies.

The answers indicate that all employees of the company are paid weekly, except that Mr. Adams does not answer for *Beverly*, and Mr. Prichard answers for *Northampton*, "Some weekly; others semi-weekly."

G 27. Was payment made promptly and regularly?

Municipalities.

The answers indicate that payment was prompt and regular.

Companies.

Yes.

G 28. Were they paid by cash, check or due bill?

The answers indicate that all employees in all plants, public and private, are paid in cash except that for *Northampton* (private), Mr. Adams answers, "Cash"; Mr. Prichard answers, "Check."

G 29. When and where were payments made?

Municipalities.

	A.	P.
Chicopee		Works.
Danvers	Station	Station, Saturdays.
Holyoke	City treasurer's office.	City hall.
Marblehead	Town treasurer's office.	Town treasurer's office.
North Attleboro	Plant	Works.
Peabody	Station	Electric plant, Saturday noons.
Taunton	Plant or at office of city treasurer	Office.
Westfield		Town hall.

Companies.

	A.	P.
Abington and Rockland	Plant	Office, Thursdays.
Attleboro	Plant or office	Office.
Beverly		Works.
Fitchburg	Plant or office	Works.
Gardner	Plant	Station.
Northampton		Office.
Salem	Office or plant	Works.
Uxbridge and Northbridge	Plant	

G 30. How were wages fixed and by whom?

Municipalities.

	A.	P.
Chicopee, Holyoke, Westfield	In large part by the manager.	Manager.
Danvers, Marblehead.	Board	Manager.
North Attleboro	Municipal board	Municipal board.
Peabody, Taunton	Manager	Manager.

Companies.

	A.	P.
Abington and Rockland	Superintendent	Manager.
Attleboro, Fitchburg, Northampton	Manager	Manager.
Beverly		By superintendent employing same, subject to approval of manager.
Gardner	Treasurer	Manager.
Salem	Manager or superintendent	Manager.
Uxbridge and Northbridge	Superintendent	

G 31. Were union rates observed?

Municipalities.

No affirmative answers, except:

Holyoke. P. Not considered except firemen.

Companies.

Where this question is answered, the answer is either, "No," or "No union."

G 32. If there were trade agreements state them.

The answers do not indicate that any trade agreements exist, in any plant—public or private.

G 33. Was there any form of collective bargaining?

The answers give no indication of any collective bargaining at any plant—public or private.

G 34. Has there ever been any concerted action among employees to have wages raised or hours shortened?

No instance of such concerted action is mentioned for any of the plants, public or private, except by Mr. Prichard in the *Salem* schedule, where he says, "Once about two years ago asked for shorter hours, which were granted."

G 35. Were the empolyees organized in unions?

No indication of any union among the workers is given, except that Mr. Prichard, in the schedule for *Holyoke*, mentions that the workmen at the gas works belong to the Gas Workers' Union.

G 36. Was the "closed shop" or "open shop" policy in force?

There is no indication that the policy of the "closed shop" is in force at any plant, public or private. The answers indicate that the question has not been raised.

G 37. Was the municipality or company opposed to organized labor?

G 38. Has there ever been a strike on the plant? If so, describe fully.

There is no indication in the answers that the question of organized labor has ever been raised for any plant, public or private, or that there has ever been a strike in any of the plants.

G 39. How were labor disputes settled?

Municipalities.

There is no indication in the answers for the municipal plants that there have ever been any labor disputes. Mr. Adams answers for *Taunton*, "Personally with Manager," with the explanation, "This refers only to agreements between the manager and individual workmen."

Companies.

The answers for the companies would also indicate that there have been no labor disputes. Mr. Adams answers for *Abington and Rockland*, "With individual workers": for *Fitchburg*, "With individual men"; for *Gardner*, *Salem* and *Uxbridge and Northbridge*, "With each man."

G 40. Were the laws relating to health, employer's liability and contract labor observed?

Municipalities.

	A.	P.
Chicopee, *Holyoke*, *North Attleboro*, *Westfield*	Probably	Yes
Danvers, *Peabody*, *Taunton*	Probably	Yes
Marblehead	Probably	No
All Companies	Probably	Yes

G 41. Were there any printed or written instructions to employees? If so, enclose copies.

The only instructions referred to are as follows:

Attleboro. P. Yes; on bulletin boards.

Salem. P. Yes; no extra copies.

G 42. How were employees treated by management?

Municipalities.

	A.	P.
Chicopee		With fairness
Danvers	Fairly	Good
Holyoke, Westfield		Good
Marblehead	Properly	Considerately
Northampton	Properly	Properly
Peabody	Fairly	Fairly
Taunton	Properly	Well treated

Companies.

Abington and Rockland, Attleboro, Salem		Fairly
Beverly, Northampton		Good
Fitchburg		Very liberally
Gardner		With fairness
Uxbridge and Northbridge		

G 43. Did the employees have a share in the management of the plant?

There is no indication of any such share in any schedule.

G 44. Were bicycles used in the business by employees? If so, how many and for what purpose?

Municipalities.

There is no indication of the use of bicycles by employees of municipal plants, except:

	A.	P.
Peabody	Yes	One for patrolling
Westfield		One or two owned by employees

Companies.

The only use of bicycles mentioned for the private companies is by Mr. Prichard.

Attleboro. Yes. Trimmer, meter reader and linemen.

Beverly. Two; one in gas, one in electric, one patrol, one emergency calls.

Salem. Two used for collecting and trouble work.

G 45. Did employees ride in the street cars for business?

Municipalities.

	A.	P.
Chicopee, Westfield		Yes
Danvers	No	Yes
Holyoke	When necessary	Yes
Marblehead	No	No
North Attleboro	Yes	No
Peabody	Yes	Yes
Taunton	Yes	

Companies.

All "Yes," except:

Beverly		Yes
Northampton		No

G 46. How were their fares paid?

Municipalities.

	A.	P.
Chicopee		City
Danvers, Westfield		By themselves
Holyoke	By city when on city business	By the department
Marblehead		None
North Attleboro	By town when on town business	By themselves
Peabody	The town, when on business connected with the plant	The town
Taunton	By the city	

Companies.

All, "by the company," except:

	A.	P.
Beverly		By the company
Northampton		None

G 47. Were any technical journals subscribed for?

Municipalities.

The only case of subscriptions for technical journals are: A. "Yes" for *Holyoke*. P. "One" for *Westfield*.

Companies.

	A.	P.
Abington and Rockland		Yes
Attleboro, Fitchburg, Salem	Yes	Yes
Beverly, Northampton		No
Gardner	Received	Yes
Uxbridge and Northbridge	No	

G 48. Did the superintendent or engineer attend technical meetings?

Municipalities.

	A.	P.
Chicopee, Westfield		No
Danvers	Yes	No
Holyoke	Yes, the manager	Yes
Marblehead, Peabody	Yes	Yes
North Attleboro	No	No
Taunton		Yes

Companies.

	A.	P.
Abington and Rockland, Salem	Yes	Yes
Attleboro	Yes, the manager	Yes
Beverly, Northampton		Yes
Fitchburg	Yes	Yes
Gardner	Yes	Yes, both
Uxbridge and Northbridge	Yes	

G 49. If so, were his expenses paid by himself?

Municipalities.

	A.	P.
Danvers	Yes	No
Holyoke	No	No
Marblehead, Peabody	Yes	Yes
Taunton		Yes

No other answers.

Companies.

	A.	*P.*
Abington and Rockland	Yes	By the company
Attleboro, Gardner	By the company	By company
Beverly, Northampton		Yes
Fitchburg		No
Salem	The company paid traveling expenses	No
Uxbridge and Northbridge	By the company	

G 50. Number of persons killed during past year? (a) Employees. (b) Others.

Municipalities.

None given, except Mr. Adams, for *Danvers,* says one employee was killed, and for *Taunton,* "One lineman hurt, and the insurance company paid. My replies refer to the electric departments only." Mr. Prichard answers, for *Danvers,* "None."

G 51. Number of persons injured? (a) Employees. (b) Others.

Mr. Adams does not give any as being injured. Mr. Prichard gives two employees for *Chicopee,* one for *Peabody,* and says, for *Holyoke,* (a) "Trivial injuries to a few in gas department."

Companies.

G 50 and 51. No killed or injured mentioned, except as follows:

	A.	*P.*
Fitchburg G 50	One person not in the employ of the company was killed by electric current	One was drunk and fell in tar tank
Salem G 50	(a) One	None
	(b) None	One killed by live wire; one claimed to be killed by company

G 52. What was the amount of damages usually paid for death?

Municipalities.

The only indication of any attempt to collect damages is found in Mr. Adams' schedule for *Danvers,* in which he answers, "In litigation."

Companies.

The only reference to damages for death by the companies are as follows:

Attleboro. P. One death, $3,500.

Salem. A. If any payment is made, it is by the insurance company. P. Not enough instances to strike an average.

G 53. Were payments for injuries usually adequate?

Municipalities.

For the municipalities the only answers applicable are:

Holyoke. P. Yes (only one case).

Peabody. P. Yes.

Taunton. P. Yes.

Companies.

Abington and Rockland, Attleboro, Beverly, Salem. P. Yes.

Fitchburg. P. Insurance company settles.

Gardner. P. None.

Northampton. P. Settled by insurance company.

No other answers.

G 54. Were cases usually settled without lawsuit?

Municipalities.

	A.	*P.*
Chicopee		Only one case which was sued
Danvers	No cases	No cases
Holyoke	One suit	Yes, it was
Marblehead	One suit by workman	One $10,000 lawsuit pending
North Attleboro		
Peabody	Suit in one case	Yes
Taunton, Westfield		Yes

Companies.

Abington and Rockland	Depends on insurance company	One case, lawsuit
Attleboro, Beverly, Fitchburg, Northampton, Salem		Yes
Gardner		None to settle
Uxbridge and Northbridge	Company insured	

G 55. May the municipality or company compromise or settle claims without lawsuits?

Municipalities.

	A.	*P.*
Chicopee, North Attleboro, Westfield		Yes
Danvers	Insured against accidents to employees	Yes
Holyoke	Insured against claims.	Yes
Marblehead	Insured against accident liability	Insured in liability company
Peabody	Yes	Yes
Taunton	City insured and all payments to those injured made by insurance company	Yes

Companies.

P. "Yes" for all.

A. As follows:

Abington and Rockland. The insurance company pays or defends claims brought by employees.

Attleboro. Company insured against claims of employees.

Beverly, Northampton. ———.

Fitchburg, Salem. Yes.

Gardner. Yes; but company is insured against claims by employees.

Uxbridge and Northbridge. The company is insured against damage resulting from accidents to its employees, and the insurance company settles or defends claims.

ENGINEERING MATTERS

Massachusetts Electricity Works

(Schedule III)

By ALTON D. ADAMS and CHARLES F. PRICHARD

Schedules for each plant prepared separately by Mr. A. D. Adams and Mr. C. F. Prichard, except that Mr. Prichard prepared no schedule for the private company of Uxbridge and Northbridge. Where the two investigators make identical answers to a given question, the answer is given without designating the authors. Where the answers differ, the answer of each investigator is designated by the initial of the surname of the author.

H—CHARACTER OF SERVICE AND PLANT.

H 1. Data for year ending June 30, 1906.—A.

(The data given for all schedules are supposed to be for the year ending June 30, 1906, although Mr. Prichard gives no date whatever for his schedule for Chicopee, and omits the day and month for the schedule for Danvers.—Gray.)

PLANT EQUIPMENT.

H 2. Steam engines.

Municipalities.

Chicopee. 250 horse power erected in 1896. 500 horse power erected in 1902. One cross compound horizontal engine of 250 horse power at 87 revolutions per minute. One cross compound horizontal engine of 500 horse power at 80 revolutions per minute. Both engines are run condensing and belted to countershaft. Steam pressure, 100 pounds. Total horse power, 750.—A.

One cross compound, 87 revolutions per minute, belted, 250 horse power, 15 by 28 by 42, and one cross compound, 80 revolutions per minute, belted, 500 horse power, 20 by 38 by 42. Slater. —P.

Danvers:

No.	*Type.*	*Speed. R. P. M.*	*Belted or direct connected.*	*Horse Power.*	*Date of Installation.*	*Total Horse Power.*
1	Simple Horizontal...	300	Belted	80	1888	80
1	Simple Horizontal...	160	Belted	160	1897	160
1	Simple Vertical Twin Engine	220	Belted	520	1905	520
						760 A.

No.	Type.	Speed. R. P. M.	Belted or direct connected.	Horse Power.	Date of Installation.	Total Horse Power.
1	Ball Simple.........	310	Belted	60	1889	10 x 12
1	Buckeye Simple....	160	Belted	180	1896	15 x 24
1	Shepard Double Upright	220	Belted	540	1906	18 x 17 P.
Holyoke:						
2	Simple Horizontal..	75	Belted	400	1891	800
1	Curtis Steam Turbine	1,800	Direct	666	July, 1905	666
						1,466 A.
2	Corl.	75	Belted	400	....	800
1	Curtis Turbine.....	..	......	666	....	666 P.
Marblehead:						
1*	Horizontal Compound	95	Belted	250	1895	250
1	Simple	95	Belted	150	1895	150
						400 A.
1	Simple	96	Belted	150	1895	150
1	Cross	96	......	250	1895	250
1	14 x 56	..	......	..	....	..
1	14 x 26 x 36	..	......	..	....	.. P.
	* Steam pressure 100 lbs.					
North Attleboro:						..
1	Horizontal Tandem Compound Condensing	128	Belted	250	1899	..
1	Horizontal Tandem Compound Condensing	100	Belted	225	1893	..
1	Simple	260	Belted	75	1893	..
				550		550 A.
1	Fitchburg	100	Belted	225	?	225
1	Fitchburg	200	Belted	75	?	75
1	Fitchburg	125	Belted	250	?	250 P.
Peabody:						
1*	Simple	100	Belted	150	1892	150
1*	Simple	92	Belted	250	1895	250
1*	Simple	340	Belted	75	1900	75
						475 A.
1	Simple	100	Belted	150	1892	150
1		92	......	250	1895	250
1		340	......	75	1900	75 P.
	* All 100 lbs. steam pressure.					
Taunton:						
2	Vertical Cross Compound	150	Direct Connected	620	1903	1,240

Each with cylinders 17 inches and 36 inches in diameter, respectively, and 30-inch stroke.

Each engine direct connected to a 400 K. W. electric generator.—A.

2	Vertical McI. & S. .	150	D. C.	620	1903	1,240

Cylinders 17 x 36, stroke 30—P.

Westfield: *No.*	*Type.*	*Speed, R. P. M.*	*Belted or direct connected.*	*Horse Power.*	*Date of Installation.*	*Total Horse Power.*
1	Horizontal Cross Compound	118	Belted	220	1902	220
1	Tandem Compound Horizontal	250	Belted	90	1888	90
1	Tandem Compound Horizontal	221	Belted	140	1897	140
						450 A.
1	Cross Compound Cond.	118	Slater Belted	220	....	220
1	Tandem Compound.	250	McI. & S. Belted	90	....	90
1	Tandem Compound.	221	Harrisburg Belted	140	....	140
						450 P.

Companies.

Abington and Rockland:						
1	Compound	200	Belted	250	....	250
1	Compound	200	Belted	350	....	350
1	Compound	270	Belted	125	....	125
						725 A.
1	McI. & S...........	200	Belted	250	....	250
1	McI. & S...........	200	Belted	350	....	350
1	Ball	270	Belted	125	....	125
						725 P.
Attleboro:						
1	Curtis Turbine......	1,800	D. C.	800	....	800
1	Cross Compound....	120	Belted	800	....	800
1	Tandem Compound..	225	Belted	450	....	450
1	Simple	325	Belted	100	....	100
						2,150 A.
1	Curtis Turbine.....	1,800	D. C.	800	1906	800
1	Lane & Bodley Compound Condensing.	120	Belted	800	....	800
1	McIntosh & Seymour Tandem Compound	225	Belted	450	....	450
1	Arm and Sims......	325	Belted	325 (?)	....	100
						2,150 P.

Beverly. As Mr. Charles F. Prichard is one of the directors of the Beverly company, and was president pro tem. in 1906, I have given only those answers that could be derived from the public records, and from inspection of the property relative to this plant.—A.

No.	*Type.*	*Speed, R. P. M.*	*Belted or direct connected.*	*Horse Power.*	*Date of Installation.*	*Total Horse Power.*
1	Cross Compound....	100	......	175	....	175
1	Cross Compound....	100	......	350	....	350
						525 A.

One 800 h. p. steam turbine under contract, but not in position on June 30, 1906.—A.

No.	Type.	*Speed, R. P. M.*	*Belted or direct connected.*	*Horse Power.*	*Date of Installation.*	*Total Horse Power.*
1	Compound Condensing	100	Belted	175	....	175
1	Compound Condensing	100	Belted	350	....	350
1	Curtis Turbine.....	1,800	......	800	....	800 P.
	Fitchburg:					
1	Vertical Cross Compound	120	......	600	....	600
1	Vertical Cross Compound	120	......	900	....	900
						1,500
	Each engine has 150 pounds steam pressure.—A.					
1	Cross Compound Upright	120	D. C.	600	....	600
1	Cross Compound....	120	D. C.	900	....	900 P.
	Gardner:					
1	Triple Cylinder Diesel internal combustion engine, burning oil	..	Belted	225	....	225
1	Compound Condensing	138	Belted	75	....	75
1	Compound Condensing	138	Belted	50	....	50
1	Compound Condensing	120	Belted	150	....	150
1	Compound Condensing	120	Belted	100	....	100
1	——..............	400	D. C.	30	....	30
1	——..............	290	D. C.	75	....	75
						705 A.
1	Compound Condensing	138	Belted	75	....	75
1	Compound Condensing	138	Belted	50	....	50
1	Compound Condensing	120	Belted	150	....	150
1	Compound Condensing	120	Belted	100	....	100
1	Simple	400	D. C.	30	....	30
1	Compound Condensing	290	D. C.	75	....	75
						705 P.
	Northampton:					
1	Compound	130	......	325	....	325
1	Compound	76	......	500	....	500
	(Each of the above 125 pounds steam.)					
1	Compound	120	......	450	....	450
						1,275 A.
1	Cross Compound Condensing (1).....	130	Belted Buckeye	325	....	..
1	Tandem Compound Condensing (2).....	120	Belted Buckeye	450	....	..
1	Cross Condensing (3)	76	Belted Slater	500	....	..

Note (1) 15 inches x 26½ inches.
(2) 16½ inches x 30½ inches.
(3) 29¼ inches x 38 inches.—P.

Salem:

No.	*Type.*	*Speed, R. P. M.*	*Belted or direct connected.*	*Horse Power.*	*Date of Installation.*	*Total Horse Power.*
1	Compound Cylinders 30 & 23 x 22.....	160	......	350	....	350
				(Not in use)		
1	Compound Cylinders 20 & 40 x 42.....	120	D. C.	635	....	635
1	Compound Cylinders 24 & 48 x 42.....	120	D. C.	900	....	900
1	Compound Cylinders 17 & 33 x 36.....	125	D. C.	500	....	500
						2,385 A.
					Cylinders. H. L.	
1	Vertical	160	D. C.	350	13 x 23	350*
1	Vertical	120	D. C.	635	20 x 40	635*
1	Vertical	120	D. C.	900	24 x 48	900*
1	Vertical	125	D. C.	500	17 x 33	500†
						2,385 P.

* McIntosh and Seymour. † Prov. stm. eng.

Uxbridge and Northbridge:

2	Simple	250	......	175	....	350
1	Simple	200	......	356	....	356
1	Compound	225	......	250	....	250
						956 A.

H 3. Boilers.

Municipalities.

Chicopee:

Number.	*Type.*	*H. P.*	*Date.*	*Steam Pressure.*	*Total H. P.*
2	Fire Tube................	135	1896	100 lbs.	270
2	Fire Tube................	135	1902-1906	100 lbs.	270
					540 A.
2	H. T. 72 inches x 140 inches x 3 inches..............	135	Atlantic Works	...	270
2	H. T. 72 inches x 120 inches x 3 inches..............	135	Holyoke S. B. Works.	...	270
					540 P.

Danvers:

1	Fire Tube................	125	1896	...	125
2	Fire Tube................	150	1905	120 lbs.	300
					425 A
2	H. T.....................	112	1906	72 in. x 18 in.	
1	H. T.....................	125	1896	72 in. x 18 in.	P

Holyoke:

5	Fire Tube................	165	1891	100 lbs.	825
3	Fire Tube................	300	July, 1905	150 lbs.	900
					1,725 A.
5	Manning	165	....	...	...
3	Manning	300	....	...	... P.

Number.	Type.	H. P.	Date.	Steam Pressure.	Total H. P.
Marblehead:					
2	Fire Tube................	130	1895	100 lbs.	390 A.
1	Fire Tube................	130	....		
1	H. T.....................	130	1895	...	130
1	H. T.....................	130	1895	...	130
1	H. T.....................	130	1900	...	130
	72 inches x 18 inches x 3½ inches.				390 P.
North Attleboro:					
1	Water Tube...............	250	1893	110	500 A.
1	Water Tube...............	250	1899	110	
2	Climax...................	250	....	...	500 P.
Peabody:					
2	Fire Tube................	125	1892	...	400 A.
1	Fire Tube................	150	1901	100	
1	H. T. 92 3½-inch Tubes...	125	1892	...	250
2	H. T. 128 3-inch Tubes....	150	1901	...	150 P.
Taunton:					
3	Heine Water Tube........	300	1903	150	900 A.
3	Heine Water Tube........	300	1903	...	900 P.
	2 36-inch shells each. Brick setting.—P.				
Westfield:					
2	Fire Tube................	70	1888-89	115	240 A.
1	Fire Tube................	100	1896		
2	H. T. (Bigelow Co.).......	70	54-inch 76 3-inch tubes		140
1	H. T. (Bigelow Co.).......	100	66-inch 86 3-inch tubes		100
					240 P.

Holyoke. (Apparently connected with H 2, written on a blank page opposite H 1-6.—G.). Gas Plant.—Land, 132,481 square feet. Humphreys and Glasgow Lowe process, 10 benches, 6 retorts; coal gas, 60; capacity of works, 500,000; 4 gas holders; 1, 750,000; 1, 52,000; 1, 115,000; 1, 141,000.

Mains: 1-inch, 1,955; 1¼-inch, 6,552; 2-inch, 9,699; 2½-inch, 1,950; 3-inch, 70,250; 4-inch, 56,614; 6-inch, 42,761; 8-inch, 9,261; 12-inch, 10,475; 15-inch, 440; 16-inch, 6,578; total, 219,891.

Gas Meters.—3, 5,927; 5, 167; 10, 160; 20, 56; 30, 37; 45, 24; 50, 1; 60, 12; 180 (80?), 5; 100, 7; 150, 5; 200, 5; 300, 4; 400, 1; total, 6,411. Prepayment of the foregoing: 2,946, 3; 9, 5; 5, 10. 5,575 gas stoves. Price of gas, $1.40, 20c. for discount, $1.20 net. Price of electricity, 12c. for K. W. H.; 2c. discount by 10th. Gas coal, 9,200 tons at 4.41 long; electric coal, 1,095 tons at 5.81 long; coke, 9,305 bu. at 11.35.—P.

Westfield. Gas Plant Schedule.—P. Land, 1.35 acres; benches, 5; retorts, 16; holders: 1, 48 by 16; brick tank, 50 by 17; capacity, 28,000 cubic feet. 1 60 by 20; steel tank 63½ by 20½; capacity, 56,420 cubic feet.

Mains.—1¼-inch, 252; 1½-inch, 609; 2-inch, 5,928; 3-inch, 47,194; 4-inch, 22,315; 6-inch, 4,901; 8-inch, 2,506; 12-inch, 1,722; total, 85,157.

Meters.—3 lights, 10,351 (?) (Is it 1,035?—G.); 5, 95; 10, 24; 20, 12; 30, 5; 45, 3; 50, 1; 60, 3; 80, 2.

Prepayment meters.—3 lights, 202; 5 lights, 13.

Output, maximum, December 23, 1905, 106,900; minimum, April 30, 1906, 36,100; capacity per diem, 146,000.

Number of feet manufactured during year	22,754,600	
Number of feet on hand June 30, 1905	71,400	
		22,826,000
Sold by meter	21,452,200	
Supplied to public buildings	306,200	
Used at works	201,300	
On hand June 30, 1906	59,000	
Total		22,018,700
Unaccounted for		807,300

No meter charge. Number of gas stoves used by consumers, 674; gross price. $1.50; 20 cents per thousand discount within 15 days; coal. 2,427 tons; 2,000 pounds at $3.76½ a ton; 843½ tons of coke at $3.51¼;

Residuals.—Coke, 84,765 bushels (602 tons sold), at $4 per ton; tar, 32,436 gallons (25,130 gallons sold), at 5 cents per gallon.—P.

Companies.

Number.	Type.	H. P.	Date.	Steam Pressure. (Lbs.)	Total H. P.
Abington and Rockland:					
4	Fire Tube	150	....	125	600 A.
3	H. T.	150	Various	...	450
1	H. T.	150	Various	...	150
					600 P.
Attleboro:					
2	Water Tube	175	....	130	350
1	Water Tube	...	....	130	225
2	Water Tube	212	....	130	424
1	Water Tube	...	....	130	350
					1,349 A.
2	B. & W. Water Tube	175	....	130	350
1	B. & W. Water Tube	225	....	130	225
2	B. & W. Water Tube	212	....	130	424
1	B. & W. Water Tube	350	....	130	350
					1,349 P.
Beverly:					
2	Water Tube	104	....	120	208
1	Water Tube	170	....	120	170
1	Water Tube	300	....	120	300
	Usual steam pressure 120.—A				678 A.
1	Water Tube 42-inch drums 81 4-inch tubes	170	....	...	170
2	Water Tube 36-inch drums 144 4-inch tubes	300	....	...	300
2	Water Tube 36-inch drums 54 4-inch tubes	104	....	...	208
					678 P.

Fitchburg:

Number.	Type.	H. P.	Date.	Steam Pressure. (Lbs.)	Total H. P.
3	Water Tube	258	....	150	774 A.
	Steel frame setting.—A.				
3	Sterling	258	....	...	774 P.

Fitchburg. Gas Plant. 5 acres of land; 6 benches of 6 retorts each; 1 covered holder, 29,000 cubic feet; 1 covered holder, 65,000 cubic feet; 1 open holder, 100,000 cubic feet.

Street Mains.—1¼, 1,324; 1½, 2,587; 2, 11,249; 3, 50,910; 4, 112,244; 6, 16,737; 8, 12,570; 10, 2,000; 12, 1,623; 16, 853.

Gas Meters.—3 lt. 2,511; 5, 286; 10, 70; 20, 29; 30, 32; 45, 1; 50, 16; 60, 6; 80, 2; 100, 9; 150, 1; 200, 1; total, 2,954.

Prepayment meters, 845; gas stoves, 2,140; gas engines, 1.

Greatest output in 24 hours, December 23, 1905, 260,800 cubic feet. Least output in 24 hours, April 15, 1906, 93,800 cubic feet. Gas sent out day during year, 20,116,100 cubic feet. Gas price, $1.55, less 20 cents per 1,000 feet if paid before 20th of month. $5 minimum per year.

Prices obtained from residuals: Tar, .045 and .025; coke, per bushel, 8 cents, 13 cents, 14 cents, 15 cents.—P.

Gardner:

Number.	Type.	H. P.	Date.	Steam Pressure. (Lbs.)	Total H. P.
1	Fire Tube	150	....	100	150
1	Fire Tube	80	....	100	80
1	Fire Tube	100	....	100	100
					330 A.
1	H. T.	150	....	...	150
1	H. T.	80	....	...	80
1	H. T.	100	....	...	100
					330 P.

Northampton:

Number.	Type.	H. P.	Date.	Steam Pressure. (Lbs.)	Total H. P.
4	Fire Tube	150	....	125	600 A.
3	H. T. Stearns	150	82 x 3½	...	450
1	H. T. Holyoke	150	82 x 3½	...	150
					600 P.

Salem:

Number.	Type.	H. P.	Date.	Steam Pressure. (Lbs.)	Total H. P.
8	Fire Tube	125	....	100	1,000
1	Water Tube	350	....	150	350
					1,350 A.
5	H. T. 140 3-inch	125	....	...	625
3	H. T. 126 3-inch	125	....	...	375
1	Water Tube 108 4-inch	350	....	...	350
					1,350 P.

Uxbridge and Northbridge:

Number.	Type.	H. P.	Date.	Steam Pressure. (Lbs.)	Total H. P.
1	Fire Tube	150	....	110	150
2	Fire Tube	125	....	110	250
					400 A.

H 4. Water wheels.
H 5. Gas engines.
H 6. Auxiliary engines.

The answers of the two investigators indicate that there are no water wheels, gas engines and auxiliary engines, except as follows:—

Municipalities.

Chicopee. H 6. Auxiliary engines. Two condensers for engines, condenser pumps, feet water heater.—A.

Holyoke. H 4. Water wheels. Four vertical turbines, geared to shafting, 280 H. P. each, installed in 1891. Total H. P., 1,120. Each wheel is 45 inches in diameter, head about 20 feet. Complete condensing outfit for the above steam turbines. Pumps, condenser, feed water heaters.—A.

Four Holyoke Mach., direct connected, 280 H. P. each; total H. P., 1,120.—P.

North Attleboro. H. 4, 5, 6. Condenser, jet type, for each of the two condensing engines, with pumps.—A.

Taunton. H 6. Auxiliary engines. One simple vertical engine, direct connected to a 25 K. W. exciting dynamo, erected in 1903.—A.

Companies.

Attleboro. H 4. Water wheels. One turbine wheel under head of 11 feet, 35 H. P.; one turbine, head 11 feet, 44 H. P.; total, 79 H. P. Wheels have since been removed, and the use of water power discontinued.—A.

One Rodney & Hunt, belted, 35 H. P.; 1 McCormick, 44 H. P., disused in process of elimination; total 79 H. P.—P.

Fitchburg. H 6. Auxiliary engines. One vertical engine direct connected to a 35 K. W. exciting dynamo.—A.

Gardner. H 5. Gas engines. One Diesel belted 225 H. P. oil engine.—P.

H 7. Auxiliary apparatus.

Municipalities.

Chicopee. Main shaft to which engines and dynamos are belted. Boiler pump, and pump and condensers for the engines.—A.

Danvers. Two feed pumps for boilers. 1 600 H. P. Harrison feed water heater. 5 1-16 inch main shaft and fittings, erected, in part, 1905.—A.

Two feed pumps, double, 4 by 6 inch, "Worthyte," 1906; 1 injector, Lee, 1906; 500 H. P. cup.

Heaters.—1 200 H.P. Harmsburgh, 1896; 1 600 H.P. Harmsburgh, 1906; steam piping, by Laskey, Whitten & Jackson; coal, $4.35 delivered; buckwheat, $2.90; chimneys (illegible.—G.); scales for boiler room: 1 2,000 lb. Howe wagon scale; 1 damper regulator (illegible.—G.); line shaft 17—C. I.—pedestal (illegible.—G.).

Belt. One 30-inch double belt, 76 feet long, Gratton & Knight. 1 22-inch double belt, 76 feet long, Gratton & Knight. 2 16-inch double belts, 42 feet long, Gratton & Knight. 3 8-inch double belts, 40 feet long. 1 10-inch double belt, 30 feet long.

Switchboards.—Two Westinghouse, marble panels, 48 by 30. 4 Plunger primary switches; 2 Mach.; 2 exciters rhes.; 2 ammeters;

2 volt meters deadbeat, Stanley ammeter; 1 plub arc circuit, marble switchboard, 30 by 36; 1 Whitney ammeter; 2 Stanley watt meters; 2 Stanley ins.; 6 G. E. lightning arresters.—P.

Holyoke. Four lines of 5¾-inch shafting; 1 Holyoke speed regulator, connected with the above water wheels, capable of regulating either pair; boiler pump, and pumps and condenser with the steam turbine.—A.

Marblehead. One jet condenser and pump; 1 boiler feed pump; inspirator; 5 inch main shaft with belts to engines and generators.—A.

One Knowles condensing, 1895, 400 H. P.; 1 Knowles feed pump, single act. boiler feed, 1895; 1 Wainwright heater, tubular, 1895, 250 H. P.; 1 Wainwright heater, tubular, 1895, 150 H. P.—P.

North Attleboro. One countershaft; wooden switchboard and indicating and recording meters; boiler pump, and pumps and jet condensers for engines.—A.

Peabody. Single pump for boiler water; steam cylinder, 8 by 9 inch, installed 1892; 1 300 H. P. feed water heater, installed 1892; 1 main shaft to which two engines are belted, also underground pipes for the distribution of steam heat to at least one consumer.—A.

One Tubular duplex feed water heater, 1900; I feed water pump; I feed water inspirator.—P.

Taunton. One jet condenser and 1 separator for each 620 H. P. engine; 1 hand power crane of 50 feet span, and 20 tons capacity; 3 feed water heaters, rated at 1,600 H. P. total capacity; 5 pumps for feed water, condenser and drips; all erected in 1903. —A.

Westfield. One jet condenser for engines, also feed pump duplex, probably erected in 1888; belting between engines and generators.—A.

Companies.

Abington and *Rockland.* Feed water heater, pumps and condensers, shafting and belts.—A.

Attleboro. One Green fuel economizer, rated at 1,500 H. P.; pumps and condensers.—A.

Two Bulkley jet, 1906; 3 feed water pumps.—P.

Beverly. Feed water heater, condensers, pumps, shafting and belting.—A.

One Dean condenser, 700 H. P.; one Dean condenser, 400 H. P.; 1 Dean condenser, 200 H. P.; 2 boiler feed pumps, one for 2,000 H. P. supply, one for 600 H. P.—P.

Fitchburg. Pumps, feed water heater and condensers; traveling crane in engine room.—A.

Gardner. Pumps, condensers and belting.—A.

Condensers, boiler feed pumps and so forth.—P.

Northampton. ————

Salem. Feed water heaters, condensers, shafting, belts and pumps.—A.

Uxbridge and *Northbridge.* ————

H 8. Dynamos.

(a) Direct current constant potential.
(b) Direct current constant current.
(c) Alternating current.
(d) Boosters set or motor generators.
(e) Rotary converters.
(f) Frequency changers.—A.

Municipalities.

Chicopee. (a) ——————

(b) 4 T. & H. arc dynamos, of 6 8-10 amperes, 17 kilowatts and 50 lamps capacity each, one erected in 1887, one in 1893, one in 1894, and one in 1896, all belt driven. Total kilowatts, 68.

(c) Alternating current. One revolving armature alternator, 180 kilowatt capacity, at 2,300 volts, 125 cycle, single phase, and 750 r. p. m., erected in 1902. All alternators belt driven. Exciters for the three alternators. One revolving armature alternator, 90 K. W. capacity at 1,100 volts, 125 cycle, single phase, 1,250 r. p. m., erected in 1896. One revolving armature alternator, 120 K. W. capacity at 1,100 volts, 125 cycle, single phase, 1,070 r. p. m., erected in 1898.

Total K. W. of alternators, 390.—A.

(a) Direct current constant potential. Exciters.

(b) Direct current constant current.

No.	*B. or D. C.*	*Type.*	*Amp.*	*K. W.*	*Date.*	*Total K. W.*
4	B.	G. E. L. D. 12......	6 8/10	17	....	68

(c) Alternating current.

No.	*B. or D. C.*	*Type and Phase.*	*Voltage.*	*K. W.*	*Date.*	*Total K. W.*
1	B.	G. E. Single Phase.	1,000	90	1896	90
1	B.	....	....	120	....	120
1	B.	....	....	180	....	180 P.

Danvers. (a) Direct current constant potential. Two 125 volt exciters for alternators.

(b) Direct current constant current.

No.	*B. or D. C.*	*Type*	*Amp.*	*K. W.*	*Date.*	*Total K. W.*
3	Belted	Brush	6 6/10	14 4/10	....	43 2/10
1	B.	Brush	6 6/10	42	1905	42
		Total				85 2/10

(c) Alternating current.

No.	*B. or D. C.*	*Type and Phase.*	*Voltage.*	*K. W.*	*Date.*	*Total K. W.*
1	Belted	60 Cycle, Two Phase..	2,200	120	....	120
1	Belted	60 Cycle, Single Phase	2,200	60	....	60
		Total K. W...................................				180

(d) Marble switchboard with instruments for alternators and arc dynamos.—A.

(a) Direct current constant potential.

No.	*B. or D. C.*	*Type.*	*Voltage.*	*Date.*	*Total K. W.*
1	Belted	Westinghouse	125	1896	Exciter for 60 K. W.
1	Belted	Westinghouse	125	1898	Exciter for 120 K. W.

(b) Direct current constant current.

No.	*B. or D. C.*	*Type.*	*Amp.*	*K. W.*	*Date.*	*Total K. W.*
3	B.	Brush	6 6/10	40 light	1899	120
1	B.	Brush	6 6/10	120 light	1906	120

(c) Alternating current.

No.	*B. or D. C.*	*Type and Phase.*	*Volt.*	*K. W.*	*Date.*	*Total K. W.*
1	B.	S. P. Westinghouse..	2,200	60	1896	60
1	B.	Two Phase Westinghouse	2,200	120	1898	120

(d), (e), (f) None.—P.

Holyoke. H S. (a) Direct current constant potential 1, 100 K. W., 500 volt, bi-polar generator, 110 volt exciting dynamos for the alternators.

(b) Direct current constant current.

(c) Alternating current.

No.	*B. or D. C.*	*Type and Phase.*	*Voltage.*	*K. W.*	*Date.*	*Total K. W.*
2	D. C. to Shafting	60 Cycle, 3 Phase	2,300	350	1903	700
1	D. C. to Shafting	60 Cycle, 3 Phase	....	450	1904	450
1	D. C. to Steam Turbine	60 Cycle, 3 Phase	....	500	1905	500
	Total K. W.					1,650

A marble switchboard of 8 panels with switches and indicating and recording meters for 2,300 volts, a. c. circuits, erected in 1903.

A marble switchboard of 8 panels with switches and instruments for constant current, transformers and lines, erected in 1903.

One 500 volt motor of about 7 H. P.—A.

(a) Direct current constant potential. Exciters for A. C.

(b) ————

(c) Alternating current.

No.	*B. or D. C.*	*Type and Phase.*	*Voltage.*	*K. W.*	*Date.*	*Total K. W.*
2	B.	G. E. 3 Phase.......	2,300	350	....	700
1	B.	G. E. 3 Phase.......	2,300	450	....	450
1	D. C.	Turbine 3 Phase....	2,300	500	....	500

(d), (e), (f) ———— —P.

Marblehead. (a) The only dynamos of this type are the 125 volt exciters for the alternators.

(b) Four constant curent arc dynamos of 25 K. W. capacity each, erected in 1895. Belt driven; operated at 7 amperes. Total K. W., 100, or 200 lamps.

(c) One 60 K. W. alternator, erected 1895; 1 72 K. W. alternator, erected 1897; 1 150 K. W. alternator, erected 1901. All these dynamos are belt driven, single phase, 60 cycle, revolving armature machines, at about 1,100 volts. Total K. W., 282.

(d), (e), (f) ———— —A.

(a) ————

(b) Direct current constant current.

No.	*B. or D. C.*	*Type.*	*Amp.*	*Lights.*	*Date.*	*Total Lights.*
4	B.	Western Electric ..	6 6/10	50 light	1895	200

(c) Alternating current.

No.	B. or D. C.	Type and Phase.	Voltage.	K. W.	Date.	Total K. W.
1	B.	Westinghouse S. P.	1,040	60	1895	60
1	B.	Westinghouse S. P.	1,040	70	1897	70
1	B.	Westinghouse S. P.	1,040	150	1900	150

(d), (e), (f) ———— —P.

North Attleboro. (a) Direct current constant potential.

The only direct current dynamos are the 125 volt exciters for the alternators, one 2 K. W. and 2 of 2½ K. W. each, all belt driven; 1 120 K. W. 1,100 volt, single phase, 125 cycle alternator at 1,070 r. p. m., belt connected, erected in 1894; 1 60 K. W. alternator as above, at 1,500 r. p. m., erected in 1894.

One 150 K. W., 1,100 volt, 2 phase, 125 cycle alternator, belt driven, at 1,000 r. p. m., erected in 1900.

Total K. W., 330.—A.

(a) ———— (b) ———— (c) Alternating current.

No.	B. or D. C.	Type and Phase.	Voltage.	K. W.	Date.	Total K. W.
1	B.	T. H. Single.......	1,040	60	....	60
1	B.	T. H. Single.......	1,040	120	....	120
1	B.	Stanley 2 Phase....	1,040	150	....	150 P.

Peabody. (a) Direct current constant potential.

Only belted exciters, 4 in number, for the alternating current dynamos.

(c) Alternating current.

One alternator of 50 K. W. capacity at 1,800 r. p. m., 1,100 volts, 140 cycles, single phase, erected in 1896; 1 alternator of 125 K. W. capacity, 1,100 volts, 133 cycles, single phase, erected in 1900, but bought second-hand.

One alternator, 175 K. W. capacity, 1,100 volts, 133 cycles, single phase, erected in 1902. Total capacity of alternators, 350 K. W. All alternators belt driven. Marble switchboards for the 1,100 volt constant pressure and the 6.6 ampere, constant current circuits. Instruments for these switchboards.—A.

No.	B. or D. C.	Type.	Voltage.	K. W.	Date.	Total K. W.
1	B.	Ft. Wayne.........	1,000	50	1896	50
1	B.	Westg.	1,000	125	1900	125
1	B.	Westg.	1,000	175	1902	175 P.

Taunton. (a) Direct current constant potential.

One 62 K. W. 500 volt bipolar dynamo, belted to induction motor. This dynamo was installed by the private electric corporation at Taunton in 1895. Subsequently sold to the city.

(b) Direct current constant current.

Two Brush arc dynamos rated at 6.6 amperes, and about 42 K. W. each, and belt driven by motors. One of these dynamos was installed in 1895, and one in 1897. A third arc dynamo not in use.

(c) Alternating current.

Two direct connected, 3 phase, 60 cycle, revolving magnet alternators, each rated at 400 K. W., and 2,300 volts, at 150 revolutions per minute. Total K. W., 800. Alternators first started in August, 1903.

(d) Motors.

One 50 H. P. and 1 75 H. P., 2,200 volt induction motor used to drive the arc dynamos and the 62 K. W. 500 volt dynamos. These two motors were installed in 1905.

A switchboard of 12 marble panels, with oil switches and indicating and recording meters for 4 generators, 2 exciters and 6 distribution circuits; 9 marble switchboard panels and fittings for 9 6.6 ampere transformers, and series arc circuits erected in 1903.—A.

One 35 K. W., 125 volt, exciting dynamo direct connected to a motor, and one 25 K. W., 125 volt exciting dynamo direct connected to simple vertical engine, erected in 1903.—A.

(a) Direct current constant potential.

No.	B. or D. C.	Type.	Voltage.	K. W.	Date.	Total K. W.
1	B.	G. E.	500	62	. . . .	62

(b) ———— (c) Alternating current.

No.	B. or D. C.	Type and Phase.	Voltage.	K. W.	Date.	Total K. W.
2	D. C.	3 Phase.	2,300	400	1903	800

(d) Boosters set or motor generators.

No.	Type.	Voltage.	K. W.	Date.	Total K. W.
1	Induction	2,300	50 H. P.	1903	. .
1	Induction	2,300	75 H. P.	1903	. . P.

Westfield. (a) Direct current constant potential. Only a 125 volt exciter for the alternator.

(b) ———— (c) Alternating current.

One 2 phase 90 K. W. Stanley alternator, installed in 1903; 1 2 phase 150 K. W. Stanley alternator; 1 2 phase 240 K. W. Stanley alternator, installed in 1904. All these alternators operate at 2,400 volts, 60 cycles; all belted to engines. Total generating capacity, 480 K. W.

A marble switchboard of 5 panels, with oil switches and indicating meters for the 2,400 volt generators and lines, erected in 1904. One marble panel for arc lines, erected in 1904.—A.

(a), (b) ————

(c) Alternating current.

No.	B. or D. C.	Type and Phase.	Voltage.	K. W.	Date.	Total K. W.
1	B	Stanley 2 Phase. . . .	2,400	90	. . . .	90
1	B	Stanley 2 Phase. . . .	2,400	240	. . . .	240
1	B	Stanley 2 Phase. . . .	2,400	150	. . . .	150
						480 P.

Companies.

Abington and *Rockland.* (a) Direct current constant potential.

Only 125 volt exciters for alternators.

(b) ———— (c) Alternating current.

One alternator of 100 K. W., and one of 200 K. W. capacity, total 300 K. W., 3 phase and 60 cycle machines, belt driven.—A.

(a), (b) ———— (c) Alternating current.

No.	B. or D. C.	Type and Phase.	Voltage.	K. W.	Date.	Total K. W.
1	B.	3 Phase 60 Cycle...	2,300	200	....	200
1	B.	....	....	100	....	100
						300 P.

Attleboro. (a) ———— (b) Direct current constant potential.

Exciting dynamos for the alternators.

(c) Alternating current.

One 3 phase 60 cycle alternator of 100 K. W.; one 3 phase 60 cycle alternator of 264 K. W.; one 3 phase 60 cycle alternator of 500 K. W., one 3 phase 60 cycle turbine alternator, 500 K. W.; total K. W., 1,364. The turbine alternator is direct connected, and the others are belt driven.—A.

(a) Direct current constant potential. Exciters for A. C. machinery.

(b) ———— (c) Alternating current.

No.	B. or D. C.	Type.	Amperes.	K. W.	Date.	Total K. W.
1	B.	3 Phase 60 Cycle...	35	100	....	100
1	B.	3 Phase 60 Cycle...	75	264	....	264
1	B.	3 Phase 60 Cycle...	150	500	....	500
1	Turbine	3 Phase 60 Cycle...	150	500	....	500
						1,364 P.

Beverly. (a) Direct current constant potential. 125 volt exciters for alternators.

(b) Direct current constant current. 3 constant current dynamos rated at 44 K. W. and 5 amperes each, belt driven. Total K. W. 132.

(c) Alternating current. 3 alternators of 350 K. W. capacity each, total K. W. 450, operating at 2,300 volts, 60 cycles, 3 phase. Since June 30, 1906, a 500 K. W., 2,300 volt, 60 cycle, 3 phase turbine generator has been added.—A.

(a) Direct current constant potential. 2 belted bipolar 125 voltage, 13½ K. W. exciters, total K. W. 27.

(b) Direct current constant current. 3 belted multicircuit 5 ampere 44 K. W. Total K. W. 132.

(c) Alternating current.

No.	B. or D. C.	Type and Phase.	Voltage.	K. W.	Date.	Total K. W.
3	B.	3 Phase Rev. Field.	2,300	150	....	450

(1 500 K. W. Curtis turbine, installed in June ————).—P.

Fitchburg. (a) Direct current constant potential. 3 125 volt exciting dynamos of 35 K. W. each. 2 direct connected to motors and one to steam engine.

(b) ———— (c) Alternating current.

1 direct connected alternator....................	400 K. W.
1 direct connected alternator....................	600 K. W.
	1,000 K. W.

Both 60 cycle 3 phase at 2,200 volts.

(d) Boosters set or motor generators. 2 motors connected respectively with two of above exciting dynamos.—A.

(a) Exciters. ———— (b) ———— (c) Alternating current.

No.	B. or D. C.	Type and Phase.	Voltage.	K. W.	Date.	Total K. W.
1	D. C.	3 Phase G. E. 60 Cycle	2,300	400	....	400
1	D. C.	3 Phase G. E. 60 Cycle	2,300	600	....	600 P.

Gardner. (a) Direct current constant potential. 1 40 ampere, 1 20 ampere, and 1 25 ampere exciter, all belted and operating at 110 to 125 volts; total capacity 10.6 K. W.

(b) Direct current constant potential. 1 20, 1 50, and 1 150 K. W. 500 volt direct current generators, total capacity 220 K. W.

(c) Alternating current. One 25 K. W., one 120 K. W., one 150 K. W., and one 210 K. W. alternator, all belt driven, and 2,300 volt, 133 cycle, single phase. Total K. W. capacity, 505.

(d), (e) (f) ———— —A.

(a) Direct current constant potential.

No.	B. or D. C.	Type.	Voltage.	K. W.	Date Installed.	Total K. W.
1	D. C.	Triumph	500	20	....	20
1	D. C.	Triumph	500	50	....	50
1	B.	Stanley	500	150	....	150
						220

(b) ———— (c) Alternating current.

No.	B. or D. C.	Type and Phase.	Voltage.	K. W.	Date.	Total K. W.
1	B.	S. Ph. T. H........	1,000	120	....	120
1	B.	S. Ph. T. H........	1,000	25	....	25
1	B.	S. Ph. Stanley.....	1,000	150	....	150
1	B	S. Ph. Stanley.....	1,000	210	....	210
						705

All with exciters.

(d), (e), (f) ———— —P.

Northampton. (a) ———— (b) 2 Brush arc dynamos, each rated at 39.6 K. W., 6.8 amperes, and 120 open arc lamps of 1,200 nominal candle power. Total K. W. 79.2. Dynamos belt driven. 1 alternator of 180 K. W. capacity, and one of 120 K. W. capacity. Total alternator capacity 300 K. W.

(c) 1 55 K. W., and 1 65 K. W. direct current 500 volt generator, both belt driven; total K. W. 120.—A.

(a)

No	B. or D. C.	Type.	Voltage.	K. W.	Date.	Total K. W.
1	B	G. E................	500	55	....	..
1	B	G. E	500	65	....	..

(b)

No	B. or D. C.	Type.	Amperes.	K. W.	Date.	Total K. W.
2	B	Brush Arc	6.8	39.6	....	..

(c)

No	B. or D. C.	Type and Phase	Voltage.	K. W.	Date.	Total K. W.
1	B.	Single Phase G. E...	1,040	120	....	120
2	B	Single Phase G. E...	1,040	180	....	360 P.

Salem. (a)

One 125 volt dynamo used as exciter	100 K. W.
One 125 volt dynamo used as exciter	15 K. W.
One 125 volt dynamo used as exciter	40 K. W.
One 125 volt dynamo used as exciter	30 K. W.
Total K. W. capacity	185
1 500 volt direct current generator	62 K. W.
1 500 volt direct current generator	100 K. W.
1 500 volt direct current generator	200 K. W.
	362 K. W.

(c)

One 3 phase 60 cycle 2,300 volt alternator	400 K. W.
One 3 phase 60 cycle 2,300 volt alternator	600 K. W.
One 3 phase 60 cycle 2,300 volt alternator	200 K. W.
One 3 phase 60 cycle 2,300 volt alternator	200 K. W.
Total K. W. of alternators, D. C.	1,400 K. W.

(d) Boosters set or motor generators. 1 150 K. W. 2,300 volt synchronous motor, direct connected to one 200 K. W. 500 volt direct current generator. 1 50 H. P. 2,300 volt induction motor direct connected to the 40 K. W. 125 volt exciter. 1 20 H. P. 550 volt motor belted to the 30 K. W. 125 volt exciter. Capacity of motors alone, 205 K. W.—A.

(a)

No.	*B. or D. C.*	*Voltage.*	*Total K. W.*	
1	Edison	125	100	Exciters.
1	Edison	125	15	
1	G. E.	125	40	
1	G. E.	125	30	
1	T. H.	500	62	Power.
1	Edison	500	100	
1	G. E.	500	200	
1	T. H.	500	15	

(b) ————

(c)

No.	*B. or D. C.*	*Type and Phase.*	*Voltage.*	*K. W.*	*Date.*	*Total K. W.*
1	D. C.	Rev. Field	2,300	400	....	400
1	D. C.	Rev. Field	....	600	....	600
1	D. C.	Rev. Field	....	200	....	200
1	D. C.	Rev. Field	....	200	....	200

(d) Boosters set or motor generators.

No.	*Type.*	*Voltage.*	*Date.*	*Total K. W.*
1	Synchronous	2,300	....	150
1	Induction	550	....	15
1	Induction	550	....	35 P.

Uxbridge and Northbridge. (a) 125 volt exciters for alternators. 3 550 volt 110 K. W. generators, total K. W. capacity 330.

(c) Alternating current.

1 alternator of 1,000 volts, one phase	100 K. W.
1 alternator of 1,000 volts, one phase	120 K. W.
1 alternator of 1,000 volts, three phase	200 K. W.
1 alternator of 1,000 volts, three phase	150 K. W.
1 alternator of 1,000 volts, three phase	180 K. W.
	750

The 100 and 120 K. W. alternators are 125 cycle machines, and the other alternators are 60 cycle.—A.

H 9. Storage battery. None for any plant.

H 10. Transformers. Station. (a) Constant potential. (b) Constant current.

Municipalities.

Chicopee. (b) 1 constant current transformer rated at 32 K. W., 6.6 amperes, with 125 cycle current, erected probably in 1903.—A.

(See works.)—P.

No.	*Amperes.*	*K. W. Capacity.*	*Date.*	*Total K. W.*
1	6.6	50	....	50 P.

Danvers. ———————

Holyoke. (b) Constant current (at generating station.—A.)

No.	*Amperes.*	*K. W. Capacity.*	*Date.*	*Total K. W.*
10	6.6	30	1903	300 A.
10	6.6	50 light	1903-4	...
1	6.6	75 light	....	... P.

Marblehead, North Attleboro. ———————

Peabody. (a) Constant potential. 4 transformers for the 6.6 ampere series are circuits, 33 K. W. each, installed in 1902. Total K. W. 132.—A.

(b) Constant circuit. 4 regulators for the 6.6 ampere constant current circuits.—A.

(a) Constant potential.

No.	*Primary Voltage.*	*Capacity K. W.*	*Date.*	*Total K. W.*
4	1000/1000	33	1902	132

(b) Constant current regulators.

No.	*Amperes.*	*Capacity K. W.*	*Date.*	*Total K. W.*
4	6—7	25	1902	100—P.

Taunton. (b) Constant current. 9 6.6 ampere 30 K. W., 50 lamp, transformers erected in latter part of 1903. Total K. W. 270.—A.

(b) Constant current dynamos.

No.	*Amperes.*		*Capacity K. W.*	*Date.*	*Total K. W.*
1	6.6	Brush arc	42	...	42
1	6.6	Brush arc	42	....	42

One not in use.

Constant current transformers 7—50 light 6.6 amperes.—P.

Westfield. (b) 2 7½ ampere constant current transformers of 52½ K. W. capacity each. Total capacity, 105 K. W.; erected in 1903.—A.

(a) Arc circuits. Constant potential.

No.	*Primary Voltage.*	*Capacity K. W.*
2	5,000	40 P.

Companies.

Abington and Rockland. (a) Constant potential. Three transformers of 25 K. W. each, with hand regulation for current of 6.6 ampere.—A.

Three with primary voltage of 2,300—25 K. W. capacity each. Total K. W. capacity 75.—P.

Attleboro. (a) ——— (b) Constant current. Three transformers of 46½ K. W. and 6.6 amperes and 75 lamps each. One transformer of 6 K. W. and 6.6 amperes.—A.

Three transformers of 6.6 amperes, 75 K. W. each—total K. W. 225; installed 1904.—P.

Beverly. (a) Transformers to raise the voltage for the transmission line to the Manchester Electric Company are six in number, and of 30 K. W. and 50 lamps capacity each, 2,300 volts primary, and 3,450 volts secondary.—A. ——— —P.

Fitchburg. (a) ——— (b) Nine constant current transformers rated at 30 K. W., 50 arc lamps and 6.6 amperes each.—A.

(b) Nine transformers of 6.6 amperes, 50 light capacity. Total 450 lights.—P.

Gardner. (a) ——— (b) Two transformers rated at 6.6 amperes and 50 lamps each; one transformer rated at 3½ amperes.—A.

(a) ——— (b) Two transformers of 6.6 amperes and 25 K. W. 50 light capacity. Total 50 K. W.—P.

Northampton. (a) ——— (b) ——— —A.

(a) ——— (b) Three transformers of 6.6 amperes, 50 light capacity. One transformer, 6.6 amperes, 35 light capacity.—P.

Salem. (a) Three transformers of 7½ K. W. and 2,300 to 550 volts for motor.

(b) Three transformers of 83 K. W. and 6 amperes. Two transformers of 38 K. W. and 6 amperes. One transformer of 3½ K. W. and 6 amperes.—A.

(a) Three transformers, primary voltage 2,300, 7½ K. W. Total K. W. 22½.

(b) Three transformers, 6 amperes, 50 K. W. Two transformers, 6 amperes, 25 K. W.—P.

Uxbridge and Northbridge. (a) Four transformers of 125 K. W. each, and 2,000 to 10,000 volts. One transformer of 25 K. W., and 2,000 to 10,000 volts.

(b) One transformer rated at 50 arc lamps and 6.6 amperes. One transformer rated at 3½ amperes.—A.

DISTRIBUTION SYSTEMS.

H 11. Underground lines.

Municipalities.

The only underground lines reported for the municipalities are in *Marblehead:* (a) Subways. 1,920 feet of underground conduit containing 5,760 feet of wire.

(b) Cables and wire—total length of street served. Kind and insulation. Okanite rubber.—A.

(a) 4,980 duct feet—1,660 trench feet of 3 duct vitrified clay subways. Installed 1901-02-03.

1,056 duct feet; 1,056 trench feet, all creosoted wood. Single duct subway. Installed 1890.

Number of manholes.	Size.
2	5x5x6
5	5x5x3

(b) Cables and wires. Length of street served. 1-3 of a mile.

Kind and insulation.	*Size.*	*Number of feet.*	*Voltage.*	*Date installed.*
Okonite lead covered.........	00	3,320	5,000	1902 and
	6	1,660	5,000	1903
Simplex lead covered.........	8	2,112	2,000	1890 P.

Companies.

Abington and Rockland, Attleboro. ——————

Beverly. None reported to Gas and Electric Light Commissioners, June 30, 1906.—A.

(a) Subways. 1,000 duct feet. 1,000 trench feet of steel tube. Five manholes, size unknown. 1,000 feet of R. C. lead armored No. 6 cable of 5,000 voltage.—P.

Fitchburg. (a) Subways. Vitrified clay conduit in 2, 3 and 4 duct sections, each duct 3¼ inches square. Total duct feet, 174,766.8, with 54 manholes. No wire has been laid in above conduit.—A.

(a) Subways. Multiple vitrified clay. Installed 1905-06, with 54 manholes. No cables laid yet.

Type. (duct)	*Number of trench feet.*
4....................	94.8
6....................	2,961.6
8....................	1,187.2
9....................	2,167.2
12....................	13,114.8
13....................	14,712.1
14....................	7,882.0
15....................	18,712.5
18....................	19,281.6
20....................	10,446.0
21....................	9,697.8
22....................	11,008.8
26....................	36,410.4
30....................	27,090.0
	174,766.8 —P.

Other towns. ——————

H 12. Overhead lines.

Municipalities.

Chicopee.

(a) Poles. —————— (b) Wires. Total length of street served—miles

(a) 600 chestnut poles set in streets, and 45 poles set elsewhere. Poles of street railway and telephone company are also used for the municipal lines.

The poles in position in each year were as follows:

June 30th.	*Number of poles.*	*Feet of wire in use.*	*No. Double, open, arcs.*	*No. Enclosed arcs.*
1896................	450	184,800	...	..
1897................	500	195,360	127	..
1898................	387	295,680	135	..
1899................	400	295,680	145	5
1900................	425	307,756	151	19
1901................	425	307,756	151	23
1902................	430	307,756	151	30
1903................	550	398,482	129	109
1904................	622	328,022	137	123
1905................	535	441,957	139	124
1906................	645	485,302	145	140

(b) 158,574 feet of street served. Weather proof insulation.
23,400 feet of No. 0 B. & S. gauge.
400 feet of No. 2 B. & S. gauge.
461,502 feet of No. 6 B. & S. gauge.

485,302 feet. Probably but little renewal of poles or wires, and no record of it.—A.

(a) Poles.

Number.	*Kind.*	*Size.*	*How set.*	*Average date set.*	
591	chestnut	various	....	1896	street.
45	chestnut	various	....	1896	elsewhere.

Poles of Holyoke and Springfield Street Railway Company and New England Telephone and Telegraph Company are also used.

(b) Wires—total length of street served. 158,574 feet.

Kind and insulation.	*Size.*	*Number of feet.*	*Voltage.*	*Average date strung.*
W. P.	6	81,994	6,000	1893-94
W. P.	6	52,832	6,000	1893-94
.....	..	71,046	6,000	1893-94
.....	..	51,551	6,000	1893-94
.....	..	204,079	1,000	......
.....	0	23,400	1,000	......
		484,902		

—P.

Danvers. (a) Poles. Most of the poles are 30 feet long, have 6 inch tops and set 5 feet in the ground, and are mostly chestnut. The town owns 712 poles of cedar, hard pine and chestnut, but mostly of the last named. Poles owned by the street railway, telegraph and telephone companies are used by the town to the number of 865. The number of poles owned by the town on June 30th of each year was as follows: 1896, 265; 1897, 340; 1898, 494; 1899, 554; 1900, 583; 1901, 655; 1902, 675; 1903, 675; 1904, 690; 1905, 630; 1906, 712.

There appears to be no record of the number of poles renewed, very few poles being renewed.

(b) Total length of street served, 170,247 feet. Nearly all wire is waterproof insulation, and line voltages are 2,000, 2,200 and 4,000.

158,432 feet of No. 6 B. & S. gauge wire.
3,750 feet of No. 2 B. & S. gauge wire.
338,550 feet of No. 4 and 6 B. & S. gauge wire.

The proportions of the No. 4 and No. 6 wire in the 338,550 feet are unknown.

The length in feet of line wire owned by the town on June 30th of each year was as follows: 1896, 121,440; 1897, 201,400; 1898, 238,250; 1899, 263,800; 1900, 295,225; 1901, 370,174; 1902, 401,174; 1903, 401,174; 1904, 421,574; 1905, 491,367; 1906, 500,732.—A.

(a) Poles. 712 cedar, chestnut and P. Various size and gravel set, at various dates. 865 railroad, telegraph and telephone poles also used by the lighting department.

(b) Wires. Thirty miles of street served.

Kind and insulation.	*Size.*	*Number of feet.*	*Voltage.*	*Average date strung.*
Triple braid W. P.	6	158,432	various	various
	0-2-6	105,200	....	....
	2-4-6	214,200	....	....
	2-6	22,900	....	....
		500,732		—P.

Holyoke. (a) Poles. Total number of wood and iron poles, 1,996.

June 30th.	*In Each Year. Feet of line wire.*	*Number of poles.*	*Enclosed arc lamps.*
1891	306,317	800	..
1892	318,950	1,006	..
1893	323,700	1,020	..
1894	305,300	1,060	..
1895	386,300	1,150	..
1896	346,800	1,160	..
1897	358,000	1,205	..
1898	377,250	1,304	..
1899	390,100	1,304	..
1900	391,150	1,307	21
1901	397,550	1,302	21
1902	401,750	1,323	31
1903	394,050	1,314	41
1904	638,254	2,179	718
1905	721,174	2,282	791
1906	826,304	1,996	865

(b) Wire. Total length of streets served, 189,760 feet.

Waterproof Wire June 30th 1906.

Number B. & S. gauge.	*Feet of wire.*
0000	7,000
00	6,000
1	42,200

Number B. & S. gauge.	*Feet of wire.*
2	18,561
4	50,124
6	616,842
8	28,077
10	11,580
	780,384

Number B. & W. gauge.	*Feet of wire.*
1	19,600
2	1,400
3	7,000
4	8,720
6	8,800
8	400
	45,920
	780,384
	826,304—A.

(a) Poles. 1,996 wood and iron.

(b) Wire. Total length of street served, 189,760 feet.

Kind and insulation.	*Size.*	*Number of feet.*
W. P.	4-0	7,000
	2-0	6,000
	1	61,800
	2	19,961
	3	7,000
	4	58,844
	6	625,652
	8	28,477
	10	11,580
		826,314—P.

Marblehead. (a) Poles. 1,001 poles, of which 957 are in streets. Poles are of hard pine and chestnut and are usually 30 to 35 feet long.

June 30th.	*Number of poles.*	*Feet of wire.*	*Open arcs.*	*Enclosed arcs.*
1895..........	837	302,690	163	..
1896..........	889	345,915	167	..
1897..........	899	367,815	167	..
1898..........	911	384,075	169	..
1899..........	921	410,510	162	2
1900..........	938	444,010	169	7
1901..........	944	472,975	169	9
1902..........	952	516,890	170	9
1903..........	957	514,680	170	12
1904..........	988	528,905	170	12
1905..........	990	530,106	170	11
1906..........	101	538,356	171	11

(b) Wires. Total length of streets served, 152,200 feet.

Weather Proof Wire.

No. B. & S. gauge.	*Length in feet.*
6	384,181
8	40,825
4	49,750
1	50,450
0	2,950
000	10,200
Total	538,356

Number of poles and wires renewed, if any, not known. The numbers of poles and the lengths of wire in each year are an approximate indication of the age of the poles and wires in 1906, and the same is true of the arc lamps.—A.

(a) Poles. 1,001 chestnut and h. p., various sizes set in gravel at various dates. 127 poles of New Eng. Tel. Co. also used.

(b) Wires. Length of streets served, 30 miles.

Size.	*Number of feet.*
000	10,200
0	2,950
1	50,450
4	49,750
6	384,181
8	40,825
	538,356—P.

North Attleboro. (a) Poles. 1,364 poles, mostly chestnut, 25 to 30 feet long, set 4 to 5 feet in soil. Very few poles have been replaced.

(b) Wires. Length of street served, 110,975 feet.

No. B. & S. gauge.	*Length in feet.*
8	412,970
0-1-2-3-5-8	209,781
	622,751

Weather proof wire.—A.

North Attleboro. Number of poles in each year: 1895, 1,057; 1896, 1,246; 1897, 1,256; 1898, 1,265; 1899, 1,273; 1900, 1,286; 1901, 1,299; 1902, 1,305; 1903, 1,316; 1904, 1,336; 1905, 1,347; 1906, 1,364.

Total length of wire in each year in feet: 1894, 266,640; 1895, 276,356; 1896, 299,631; 1897, 319,813; 1898, 340,634; 1899, 354,549; 1900, 362,074; 1901, 380,267; 1902, 386,130; 1903, 371,928; 1904, 582,558; 1905, 593,668; 1906, 662,751.—A.

(a) Poles. 1,301 poles in streets, chestnut, 6x8 inches and 30 to 35 feet, set 5½ feet in gravel, in 1898. 63 poles elsewhere, in 1898.

(b) Wires. Length of streets served. 21 miles.

Kind and insulation.	*Size.*	*Number of feet.*	*Voltage.*	*Average date strung.*	
W. P.	8	412,970	1120	1893	Street Lighting.
.....	0-1-2-3-5-8	209,781	1040	1893	Commercial Lighting.—P.

Peabody. (a) Poles. 731 chestnut and cedar of a usual length of 30 feet each; 643 of these poles are set in public ways, and 88 are set elsewhere.

	In Each Year.		
June 30th.	*Number of poles.*	*Total feet line wire.*	*Number enclosed arc lamps.*
1897....................	111	293,300	..
1898....................	310	367,440	0
1899....................	310	399,415	56
1900....................	320	457,465	57
1901....................	331	464,745	58
1902....................	348	311,540	194
1903....................	386	517,560	211
1904....................	400	528,560	264
1905....................	420	555,060	268
1906....................	731	578,600	241

(b) Wires. Length of streets served, 155,000 feet. 230,600 feet of No. 6 B. & S. gauge weather proof wire; 348,000 feet of No. 00 to 8 B. & S. gauge weather proof wire; 578,600 feet total length. Length of each size unknown.—A.

(a) Poles. 731 poles, cedar and chestnut. 25 to 35 feet, set in gravel; dates unknown.

(b) Wire. Total length of streets served. 30 miles.

Kind and insulation.	*Size.*	*Number of feet.*	*Voltage.*	*Average. date strung.*
W. P. Triple	00 to 8	348,000	1,100	......
W. P. Triple	6	230,600	4,000	......—P.

Taunton. (a) Poles. 1,198 poles of chestnut, cedar and hard pine. Most of the poles are of chestnut, and the usual length is 30 feet; about 6-inch tops, but larger poles are used where necessary. Poles owned by city: In 1897, 630; 1898, 830; 1899, 912; 1900, 998; 1901, 1,048; 1902, 1,073; 1903, 1,073; 1904, 1,131; 1905, 1,173; 1906, 1,198.

(b) Wires. Total length of streets served, 148,000 feet.

No. B. & S. gauge.	*Length in feet.*
00-0.................	3,600
00-6.................	5,600
2.................	300
1.................	23,100
1-4-6.................	23,800
4 & 6.................	13,100
4-6.................	138,600
4.................	900
6 & 8.................	271,600
Total.........	480,600

In Each Year.

June 30th.	*Feet of wire.*	*Enclosed arcs.*
1897	167,530	..
1898	216,135	..
1899	267,806	11
1900	309,819	49
1901	342,792	61
1902	354,739	80
1903	354,739	72
1904	459,248	218
1905	433,600	359
1906	480,600	406 —A.

(a) Poles. 1,198 chestnut and cedar poles, and hard pine, set at various dates.

(b) Wires. Total length of streets served, 28.03 miles.

Kind and insulation.	*Size.*	*Number of feet.*	*Voltage.*
W. P. triple	00-1-4 & 6	168,000	2,300-5,000
W. P. triple	00-0	3,600	500
W. P. triple	1	23,100	2,300
W. P. triple	2	300	2,300
W. P. triple	4-6	14,000	2,300-5,000
W. P. triple	6-8	271,600	5,000
		480,600	—P.

Westfield. (a) Poles. 584 poles, chestnut, of which 569 are set in public ways.

Poles in Each Year.

Year.	*Number of poles.*	*Feet of wire.*	*Number enclosed arc lamps.*
1888	137	38,799	..
1889	174	70,280	..
1890	175	70,280	..
1891	206	79,360	..
1892	252	84,060	..
1893	292	90,070	..
1894	380	111,675	..
1895	407	118,435	..
1896	425	119,935	..
1897	457	129,011	..
1898	457	129,011	..
1899	457	142,560	..
1900	490	148,791	..
1901	501	150,467	..
1902	501	158,257	30
1903	505	166,717	41
1904	509	182,297	119
1905	555	190,865	141
1906	584	216,415	154

(b) Total length of streets served, 73,586 feet. Weather proof insulation on wire; 1,760 feet of No. 8 B. & S. gauge; 180,493 feet of No. 6 B. & S. gauge; 3,400 feet of No. 4 B. & S. gauge; 7,790 feet of No. 2 B. & S. gauge; 15,580 feet of No. 1 B. & S. gauge; 7,392 feet of No. 0 B. & S. gauge; total, 216,415.—A.

(a) Poles. 584 chestnut poles, 30 to 35 feet.

(b) Wires. Length of streets served, 73,586 feet, equals 14 miles.

Kind and insulation.	*Size.*	*Number of feet.*	*Voltage.*
W. P.	6	152,763	2,400
	8	1,762	..
	2	7,790	..
	0	7,392	..—P.

Companies.

Abington and *Rockland.* (a) Poles. (b) Wires.

The company has 1,835 chestnut and cedar poles, of which 1,810 are set in the streets. Wire in overhead circuits is of a total length of 665,795 feet, in sizes of No. 8 to No. 2, B. and S. gauge, weather proof insulation. Total length of streets served, 210,400 feet.—A.

(a) Poles, 1,835 chestnut and cedar poles of various sizes, set at various dates, in gravel.

(b) Total length of streets served, 40 miles.

Kind and insulation.	*Size.*	*No. of feet.*	*Voltage.*	*Average date strung.*
W. P. Triple braid	2-4-6 & 8	253,020	various	....
W. P. Triple braid	2	40,200	various	....
W. P. Triple braid	6	365,175	various	....
W. P. Triple braid	8	7,400	various	....
	10	15,000	various	....—P.

Attleboro. (a) Poles. 1,150 hard pine and chestnut poles set in streets and 70 poles set elsewhere.

(b) Length of streets served, 217,000 feet. 687,678 feet of line wire in sizes from number 6 B. & S. gauge to cable of 500,000 circular mils. Weather proof insulation.—A.

Poles: 1,220 H. P. and chestnut of various sizes set in gravel at unknown dates.

(b) Wires: length of streets served, 40 miles.

Kind and insulation.	*Size.*	*No. of feet.*	*Voltage.*	*Average date strung.*
Triple braid W. P.	6	613,395	Various	Various
	4	24,650	Various	Various
	2	1,325	Various	Various
	0	23,129	Various	Various
	00	4,365	Various	Various
	000	385	Various	Various
	0000	1,900	Various	Various
	50,000 cir. m.	50	Various	Various
Aluminum	0	18,480	Various	Various
		687,678—P.		

Beverly. (a) Poles. Company has 2,149 cedar and chestnut poles, all set in streets.

(b) Wires. Total length of streets served, 253,305 feet. Lines contain 965,498 feet of wire in sizes from number 6 to number 0, B. & S. gauge.—A.

(a) Poles. 2,149 chestnut and cedar poles set in gravel at various dates.

(b) The total length of streets served, 50 miles.

Size.	No. of Feet.
0	25,450
2	326,360
4	95,381
6	518,307
	965,498—P.

Fitchburg. (a) Poles. 1,752 chestnut, cedar and hard pine.

(b) Wires. Total length of streets served, 190,500 feet.

Lines include 882,800 feet of wire in sizes from number 6 to 0, B. & S. gauge.—A.

(a) Poles. 1,752, chestnut and hard pine, and cedar.

(b) Wires. Total length of streets served, 37 miles.

Kind of insulation.	*Size.*	*No. of feet.*
W. P. Triple	6	620,500
W. P. Triple	4	71,900
W. P. Triple	2	85,700
W. P. Triple	0	101,700
		882,800—P.

Gardner. (a) Poles. 605 chestnut poles, set in streets. 156 chestnut poles set elsewhere.

(b) Wires. Total length of streets served, 67,866 feet. Total length of wire, 321,401 feet, weather proof insulation, in sizes from No. 14 to No. 0, B. & S. gauge.—A.

(a) Poles, 764 chestnut poles, various sizes, set at various dates, in gravel.

(b) Wires. Total length of streets served, 13 miles.

Kind and insulation.	*Size.*	*No. of feet.*	*Voltage.*	*Average date strung.*
Triple braid W. P.	0	5,077	500	Various
Triple braid W. P.	1	4,735	500	Various
Triple braid W. P.	2	45,703	500	Various
Triple braid W. P.	4	62,597	1,000	Various
Triple braid W. P.	6	183,060	Various	Various
Triple braid W. P.	8	16,900	Various	Various
Triple braid W. P.	10	2,679	Various	Various
Triple braid W. P.	14	650	Various	Various
		321,011—P.		

Northampton. (a) Poles. 1,231 chestnut poles, of which 1,082 are set in streets.

(b) Wires. Total length of streets served, 165,435 feet.

Length of mains, weather proof wire.

No. B. & S. Gauge.	*Length in Feet.*
00	60,800
0	7,000
4	7,000
6	438,900
8	13,050
000	3,780
1	2,000
	532,530—A.

(a) Poles. 1,234 chestnut, 25 to 40 feet.

(b) Wires. Total length of streets served, 165,435 feet.

Kind and insulation.	*Size.*	*No. of feet.*	*Voltage.*
W. P.	000	3,780	500
W. P.	00	60,800	1,040
W. P.	0	7,000	1,040
W. P.	1	2,000	500
W. P.	4	7,000	1,040
W. P.	6	414,910	1,040
W. P.	6	23,990	500
W. P.	8	13,050	1,040—P.

Salem. (a) Poles. 2,467 poles set in streets, and 144 poles set elsewhere. Total, 2,611. Poles of hard pine, mostly, but some cedar and chestnut.

(b) Wires. Total length of streets served, 266,900 feet. The length of line wires in sizes from No. 6, B. & S. gauge, to wire of 300,000 circular mils. in cross section, is 1,056,283 feet. Nearly all weather proof insulation.—A.

(a) Poles. 2,611 hard pine, chestnut and cedar poles of various sizes, set in gravel at unknown dates.

(b) Wires. Total length of streets served, 50 miles.

Kind and insulation.	*Size.*	*No. of feet.*	*Average date strung.*
Triple W. Proof	4-0	42,100	Unknown
Triple W. Proof	2-0	18,600	Unknown
Triple W. Proof	0	24,450	Unknown
Triple W. Proof	2	91,850	Unknown
Triple W. Proof	4	68,150	Unknown
Triple W. Proof	6	851,433	Unknown
300,000 cir. mils		3,000	
		1,099,583—P.	

Uxbridge and *Northbridge.* (a) Poles. 1,237 poles set in streets, and 295 poles elsewhere. Total, 1,532.

(b) Wires. Total length of streets served, 161,814 feet. Line wires have a length of 859,833 feet, in sizes from No. 10 to No. 00 B. & S. gauge. Insulation, weather proof; voltages, 1,000, 2,000, 10,000.

H 13. Arc lamps owned.

Municipalities.

Chicopee. 145 double open arc lamps operating with 6.8 amperes direct current. Enclosed arc lamps include 52 with 6.8

amperes; 71 with 6 amperes; and 24 with 4 amperes alternating current. Total enclosed arcs, 147; total of all arcs, 292.

(a) Direct current. 145 double open arc lamps operating with 6.8 amperes and about 500 watts each.

(b) Alternating current. 52 enclosed arcs operating with 6.6 amperes on series circuit. 71 enclosed arcs operating with 6 amperes on multiple circuit. 24 enclosed arcs operating with 4 amperes on multiple circuit.

(c) ———— (d) Total open, 145; total enclosed, 147.—A.

52 enclosed; 145 street; 45 commercial.—P.

Danvers. (a) Direct current. 130 direct current enclosed arc lamps operating with 6.6 amperes and about 500 watts each. These lamps were installed in 1905.

Enclosed Arc Lamps in Each Year.

June 30, 1902, 5; 1903, 8; 1904, 21; 1905, 15; 1906, 136.

(b) Alternating current. 6 enclosed arc lamps operating with about 6 amperes and about 360 watts each, installed in 1905.

(d) Total open ————; total enclosed, 136 arc lamps.—A.

145 1,200 C. P., 6 and 6.6 amperes, alternating current, enclosed arc lamps.—P.

Holyoke. 505 enclosed arcs operating with 6.6 amperes and about 400 watts; 360 enclosed arcs operating with 6 amperes and about 360 watts; total enclosed arcs, alternating current, 865. On June 30, 1903, the city had 41 enclosed arcs; 718 enclosed arcs in 1904; 791 enclosed arcs in 1905.—A.

503 6.6 amperes street lights; 459 6 amperes commercial; total, 962 enclosed, with alternating current.—P.

Marblehead. 163 single open arc lamps and 8 double open arc lamps operating with 7 amperes direct current; total open lamps, 171; 11 enclosed arc lamps operating with 4 to 6 amperes alternate current; total arc lamps, 182. See H 11 and 12.

(d) Total open, 171; total enclosed, 11.—A.

192 4, 6 and 7 amperes, alternating current, enclosed.—P.

North Attleboro. Two double open arcs operating with 6 amperes each, and 13 enclosed arcs operating with 6 amperes of alternating current each; total arc lamps, 15.

Arc Lamps in Each Year.

June 30.	*Double Open Arcs.*	*Enclosed Arcs.*
1902.	3	4
1903.	3	4
1904.	2	4
1905.	2	4
1906.	2	13

(d) Total open, 2; enclosed, 13.—A.

2 open, 13 enclosed.—P.

Peabody. 55 enclosed arc lamps operating with 6 amperes each, and 186 enclosed arc lamps operating with 6.6 amperes each —all alternating current—are in use. Total number of arc lamps, 241. See H 12.—A.

202 6.6 amperes, series, alternating current, 1902; 25 6 amperes, multiple; all enclosed.—P.

Taunton. All arc lamps are of the enclosed type, and include 52 lamps with 6.6 amperes of direct current; 267 lamps with 6.6 amperes of alternating current; 10 lamps with 7½ amperes, and 77 lamps with 6 amperes of alternating current; total arcs, 406, all enclosed. See H 12 (b).—A.

Arc lamps owned.	*Number.*	*C. P. or watts.*	*Amperes.*	*Date.*
Direct current.............	125	1,200	6.6	Various
Alternating series..........	275	1,200	6.6	1903
Alternating multiple.......	82	1,200	6	1903-06
Alternating multiple.......	10	1,600	7.5	1903-06

(b) Alternating. Open, ———; enclosed: 275 series, 1,200 C. P., 6.6 amperes for street lighting; 75 multiple, 1,200 C. P., 6 amperes for commercial lighting; 8 multiple, 1,200 C. P., 6 amperes for station lighting; 10 multiple, 1,600 C. P., 7½ amperes for commercial lighting.

Total enclosed, 492.—P.

Westfield. 121 enclosed arc lamps operating with 7.5 amperes, and 34 enclosed arc lamps operating with 6.6 amperes, are in use. Total arc lamps in use, 154. See H 12a.—A.

121 of 7½ amperes, and 33 of 4-6 amperes.

(a) ——————— (b) Alternating, enclosed: 117 of 7½ amperes; 37 of 4-6 amperes.—P.

Companies.

Abington and Rockland. 49 enclosed arc lamps are rated at 6.6 amperes and 1,200 C. P. each. 10 enclosed commercial arc lamps, and 3 enclosed arcs at the electric station operate with 4 amperes each. Total enclosed arc lamps 62, all operating with alternating current. No open arc lamps.—A.

55 1,200 C. P., 6.6 amperes; 35 4 and 6 amperes; all alternating current, enclosed.—P.

Attleboro. (a) ——————— (b) Alternating, 101 enclosed arc lamps operating with 6.6 amperes each. 70 enclosed arc lamps operating with 4 amperes each.

48 enclosed arc lamps operated with 6 amperes each.

(c) ——————— (d) Total, 219 enclosed arcs.—A.

240 of 4-6—6.6 amperes of various dates, enclosed, alternating current.—P.

Beverly. There are in use 308 direct current enclosed arc lamps operating with 5 amperes each, 54 enclosed arcs operating with 4 amperes of alternating current, and 57 enclosed arcs operating with 6 amperes of alternating current. Total enclosed arc lamps, 419. No open arc lamps.—A.

427 of 4, 5 and 6 amperes.

(a) Direct current, 311 enclosed. (b) Alternating, 116 enclosed.—P.

Fitchburg. (a) ——————— (b) Alternating, 324 enclosed arc lamps operated with 6.6 amperes each. 107 enclosed arc lamps rated at 2,000 C. P. each.

(d) Total enclosed, 131.—A.

322—6.6 amperes (street circuits). 107—6.6 amperes (commercial circuits.—P.

Gardner. 52 enclosed arc lamps operating with 6.6 amperes alternating current, are in use. There are no other arc lamps.—A.

80 (1,200 C. P.) 6.6 amperes, installed 1906.

80 street lamps. No multiple.

(a) ———— (b) Alternate enclosed, 80.

(c) ———— (d) Total enclosed, 80.—P.

Northampton. 74 enclosed arcs operate with 6.8 amperes direct current; 129 with 6.6 amperes, 48 with 6 amperes, and 23 with 4 amperes alternating current. Total enclosed arcs, 274. No open arcs.—A.

204 G. E. enclosed, 6.6 amperes. 74 Brush open, 6.8 amperes. —P.

Salem. 335 series enclosed arc lamps operating with 6 amperes of alternating current. 205 multiple enclosed arcs operating with 4 amperes alternating current, and 163 multiple enclosed arcs operating with 6 amperes of alternating current, are in use. Total enclosed arcs, 707. No open arc lamps.—A.

739 4, 5 and 6 amperes; various dates; alternating, enclosed. —P.

Uxbridge and Northbridge. 14 enclosed arc lamps operating with 6.6 amperes of alternating current, each. 5 enclosed arc lamps operating with 4 amperes of alternating current, each. Total enclosed arc lamps, 19. No open arc lamps.—A.

H 14. Incandescent lamps owned.

Where incandescent lamps are renewed without charge to consumers other than the regular lighting rate, these lamps are reported here as owned.—A.

Municipalities.

Chicopee. There are 9,739 incandescent lamps of 16 C. P. connected to the electric system, and 49 of these are in the station. Incandescent lamps are renewed free for old lamps.—A.

———— —P.

Danvers. There are 45 lamps of 25 C. P. each used for public lighting, and 15—16 C. P. at station.—A. 45—25 C. P. or watts.—P.

Holyoke. 15 of 30 C. P., 25 of 16 C. P., 2 of 32 C. P., and 104 lamps of 16 C. P., at station.—A. ———— —P.

Marblehead. 13 of 30 C. P., 45 of 25 C. P., 11 of 16 C. P., in streets. 38 incandescent lamps of 16 C. P. in station.—A.

69 lamps. 45 of 25 C. P., 11 of 16 C. P., and 13 of 30 C. P.—P.

North Attleboro. 613 lamps of 32 C. P. in streets, 46 lamps of 16 C. P. in station. 470 lamps of 16 C. P. in public buildings. It is uncertain whether these lamps in public buildings are a part of the property of the electric plant.—A.

613 of 32 C. P., 5¾ amperes street lights.—P.

Peabody. 5 lamps of 16 C. P. and 30 lamps of 32 C. P. in station. Public incandescent lamps include three of 16 C. P., 15 of 32 C. P. and 7 of 20 C. P.—A.

25 of 20 and 32 C. P.—P.

Taunton. 160 of 25 C. P. in streets, 40 of 16 C. P. in stations, 12,220 of 16 C. P. commercial. City renews commercial incandescent lamps free.—A. ———— —P.

Westfield. Public lamps. 4 of 25 C. P., 17 of 16 C. P., 9 of 8 C. P., 1 of 50 C. P. 23 lamps of 10 C. P. and 3 lamps of 16 C. P. in the station.—A. ———— —P.

Companies.

Abington and Rockland. 409 public incandescent lamps of 25 C. P. each. 75 incandescent lamps of 16 C. P. each, at the office and station.—A.

409 lamps of 25 C. P. or watts.—P.

Attleboro. 259 street lamps of 32 C. P. each, and 35 lamps of 16 C. P. in office and station. A comparatively small number of lamps are supplied to flat rate or contract consumers without additional charge.—A. 259 incandescent lamps. 128 32 C. P.—P.

Beverly. 35 of 16 C. P. at office and station.—A. ———— —P.

Fitchburg. 63 lamps of 30 C. P. each in streets. 320 lamps of 16 C. P. and 15 lamps of 25 C. P. in station and office.—A.

398 lamps of 16, 25 and 30 C. P.—P.

Gardner. 8,324 lamps of 16 C. P., a small part of which are sold to consumers; 15 lamps of 50 C. P. and 1 of 25 C. P. 74 lamps of 16 C. P. are used at office and station.—A. ———— —P.

Northampton. 35 street lamps of 40 C. P. 160 lamps in offices and station. The charge for current includes free lamps in city buildings.—A.

Incandescent lamps installed, 17,135, 16 C. P., 589 customers.—P.

Salem. 39,489 incandescent lamps of 2 C. P. to 150 C. P. each, are operated with alternating current on commercial services, and lamps are renewed by the company without charge. 418 incandescent lamps of 30 C. P., which are operated on streets with alternating current and renewed by the company.—A.

418 lamps of 30 C. P.—P.

Uxbridge and Northbridge. 425 lamps of 25 C. P. each in streets; 60 of 16 C. P. in station.—A.

H 15. Motors owned. For motors at *Taunton, Fitchburg* and *Salem,* see answers under H 8.

H 16. Meters.

Municipalities.

Chicopee. There are 436 meters with a total capacity of 497 K. W. Meters added since June 30, 1897, number 327.

Number of meters added each year: June 30, 1906, 66; 1905, 45; 1904, 37; 1903, 19; 1902, 43; 1901, 4; 1900, 24; 1899, 36; 1898, 53.

Meters in use June 30, 1906:

No. of Meters.	*Capacity in 16 c. p. Lamps.*
303	10
50	20
41	30
18	50
15	100
3	150
2	200
2	400
2	300
436—A.	

303 10 light; 50 20 light; 41 30 light; 18 50 light; 15 100 light; 3 150 light; 2 200 light; 2 400 light; 5 300 light; total, 439.—P.

Danvers. All meters single phase, mostly Stanley. 438 meters with a total capacity of 561.7 K. W. are in use. 437 meters added since June 30, 1898.

Number of Meters and Transformers Added in Each Year.

June 30.	*Meters.*	*Transformers.*
1906	45	26
1905	70	22
1904	40	5
1903	9	0
1902	63	12
1901	94	6
1900	72	3
1899	44	18
1898	109	27

Meters in use June 30, 1906:

19 of capacity in 16 C. P. lamps of 5; 127 of 10; 83 of 20; 181 of 30; 18 of 50; 1 of 80; 2 of 100; 6 of 200; 1 of 400; total, 438.—A.

19 5 light; 127 10 light; 83 20 light; 181 30 light; 18 50 light; 1 80 light; 2 100 light; 6 200 light; 1 400 light; total, 438.—P.

Holyoke. 587 meters with a total capacity of 1,660 K. W. are in use. Meters added since June 30, 1895, number 589.

Number of Meters and Transformers Added Each Year.

June 30.	*Meters.*	*Transformers.*
1906	200	31
1905	209	30
1904	96	17
1903	60	12
1902	3	2
1901	7	3
1900	2	2
1899	1	2
1898	3	1
1897	1	0
1896	7	6

Meters and Transformers in Use June 30, 1906.

No. of Meters.	*Capacity in* 16 *C. P. Lamps.*	*Number of Transformers.*	*Capacity in* 16 *C. P. Lamps.*
210	10	3	400
149	20	5	500
63	30	12	600
46	40	1	1,000
13	50	3	1,500
26	60	3	2,000
2	75	1	40
16	80	8	50
25	100	1	60
1	150	8	80
10	200	10	100
10	250	6	150
2	300	5	200
2	400	29	300
3	500	..	...
2	750	..	...
1	800	..	...
1	900	..	...
2	1,000	..	...
1	1,500	..	...
2	2,000	..	...
587		95—A.	

Meters: 210, 10; 149, 20; 63, 30; 46, 40; 13, 50; 26, 60; 2, 75; 16, 80; 25, 100; 1, 150; 10, 200; 10, 250; 2, 300; 2, 400; 3, 500; 2, 750; 1, 800; 1, 900; 2, 1,000; 1, 1,500; 2, 2,000; total, 587.—P.

(The above figures are reproduced as they appear in the original. The first figures in each statement apparently stand for the number of meters, the second for the light capacity.—G.)

Marblehead. 664 meters with a total capacity of 496.3 K. W. are in use. Meters added since June 30, 1895, are 637.

Number of Meters and Transformers Added Each Year.

June 30.	*Meters.*	*Transformers.*
1906	98	8
1905	70	14
1904	19	15
1903	30	23
1902	92	4
1901	51	3
1900	64	2
1899	58	11
1898	25	11
1897	54	15
1896	76	38
	637	144

Transformers and Meters in Use June 30, 1906.

No. of Meters.	Capacity in 16 C. P. Lamps.	Number of Transformers.	Capacity in 16 C. P. Lamps.
		1	500
3	15	25	10
85	20	10	12
6	30	7	15
20	40	29	20
2	50	13	30
4	80	2	40
2	150	18	50
1	160	7	75
2	200	2	80
1	240	2	100
1	300	4	125
537	10	2	150
		2	175
664		1	200
		1	250
		4	300
		130—A.	

537 of 10 light; 3 of 15; 85 of 20; 6 of 30; 20 of 40; 2 of 50; 4 of 80; 2 of 150; 1 of 160; 2 of 200; 1 of 240; 1 of 300; total, 664.—P.

North Attleboro. 251 meters added since June 30, 1895. 285 A. C. 125 cycle meters with a total capacity of 605 K. W. in use June 30, 1906. These meters are for 125 cycle, single phase current at 50 and 110 volts; sizes, .5 K. W. to 20 K. W.

Number of Meters and Transformers Added Each Year.

June 30.	Meters.	Transformers.
1906	39	20
1905	44	15
1904	4	33
1903	26	22
1902	30	13
1901	35	5
1900	18	13
1899	20	9
1898	3	2
1897	14	4
1896	18	10

Meters and Transformers in Use June 30, 1906.

No. of Meters.	Capacity in 16 C. P. Lamps.	Number of Transformers.	Capacity in 16 C. P. Lamps.
58	10	6	10
3	15	43	20
90	20	1	25
7	25	25	30
64	30	1	40

No. of Meters.	*Capacity in* 16 *C. P. Lamps.*	*Number of Transformers.*	*Capacity in* 16 *C. P. Lamps.*
8...........	40	14	50
21...........	50	1	60
1...........	80	1	70
11...........	100	2	90
5...........	150	9	100
1...........	160	14	150
9...........	200	6	200
2...........	400	4	250
5...........	300	5	300
285		132—A.	

10, 58; 15, 3; 20, 90; 25, 7; 30, 64; 40, 8; 50, 21; 80, 1; 100, 11; 150, 5; 160, 1; 200, 9; 300, 5; 400, 2; total, 285.—P.

(The above figures are reproduced as they appear in the original; the first figure mentioned in each item apparently indicates the capacity; the second the number of meters.—G.)

Peabody. There are 605 meters with a total capacity of 585.5 K. W. 624 meters have been added since June 30, 1900. The meters are General Electric Double Log.

Number of Meters and Transformers Added Each Year.

June 1.	*Meters.*	*Transformers.*
1906........	176	19
1905........	129	25
1904........	119	41
1903........	60	16
1902........	80	25
1901........	60	12
1900........	42	22

Meters and Transformers in Use June 30, 1900.

Meters.		*Transformers.*	
No.	*Capacity in* 16 *C. P. Lamps.*	*No.*	*Capacity in* 16 *C. P. Lamps.*
.. ..	...	1	6
2...........	5	1	14
397...........	10	11	10
10...........	15	2	12
134...........	20	1	15
13...........	30	46	20
14...........	40	1	25
9...........	50	5	30
10...........	80	14	40
3...........	100	19	50
1...........	120	11	60
8...........	160	2	24
2...........	200	7	80
2...........	300	5	100
.. ..	...	1	140
.. ..	...	4	150
.. ..	...	1	500

Meters.		Transformers.	
No.	Capacity in 16 C. P. Lamps.	No.	Capacity in 16 C. P. Lamps.
.. ..	...	11	200
.. ..	...	1	250
.. ..	...	1	300
605		145—A.	

2, 5; 397, 10; 10, 15; 134, 20; 13, 30; 14, 40; 9, 50; 10, 80; 3, 100; 1, 120; 8, 150; 2, 200; 2, 300; total, 605.—P.

Thomson induction largely, also Westinghouse and Siemens-Halske. (The figures are reproduced as in the original. Apparently the first figures in each item indicate the number of meters, and the second figures the light capacity.—Gray.)

Taunton. 358 meters, with a total capacity of 1,208 K. W., are in use. 365 meters added since June 30, 1897.

Number of Meters and Transformers Added Each Year.

June 30.	Meters.	Transformers.
1906........	60	34
1905........	39	19
1904........	79	26
1903........	28	16
1902........	37	18
1901........	59	0
1900........	24	11
1899........	9	5
1898........	30	16

Lighting Meters and Transformers in Use June 30, 1906.

Meters.		Transformers.	
No. of Meters.	Capacity in 16 C. P. Lamps.	Number of Transformers.	Capacity in 16 C. P. Lamps.
50...........	6	19	12
66...........	10	29	20
82...........	20	35	30
48...........	30	15	50
43...........	50	11	60
28...........	100	13	80
3...........	150	1	500
5...........	300	9	100
1...........	200	3	120
2...........	400	18	150
8...........	600	1	600
.. ..	...	5	200
.. ..	...	3	400
.. ..	...	1	300
341		163	

Power Meters and Transformers in Use June 30, 1906.

Meters.		Transformers.	
No. of Meters.	*Ampere Capacity.*	*Number of Transformers.*	*Ampere Capacity.*
1	3	4	1.5
5	10	9	3
5	15	6	4
6	25	2	5
3	50	6	7½
3	75	5	10
2	100	6	15
1	150	4	25
1	300	3	50
27		45—A.	

Meters: 50 A. C. 6 light; 66 10 light; 82 20 light; 48 30 light; 43 50 light; 28 A. C. 10 light; 3 150 light; 1 200 light; 2 400 light; 3 600 light; 5 A. C. 300 light. Power: 1 D. C. 3 amp.; 5 D. C. 10 amp.; 5 D. C. 15 amp.; 6 D. C. 25 amp.; 3 A. C. 50 amp.; 3 75 amp.; 2 100 amp.; 1 150 amp.; 1 300 amp. Total, 358.—P.

Westfield. 120 A. C. meters, single phase, of 217.5 K. W. total capacity are in use.

Meter List.

No. and Size of Each.	*Capacity in Lamps of* 50 *Watts.*
43	10
2	15
22	20
20	30
2	40
14	50
2	60
11	100
1	150
2	200
1	300
120	

123 meters added since June 30, 1903.

Meters and Transformers Added in Each Year.

June 30.	*No. of Meters.*	*No. of Transformers.*
1906	63	20
1905	45	10
1904	15	4
1903	17	7—A.

Meters: 43, 10 light; 2, 15; 22, 20; 20, 30; 2, 40; 14, 50 light; 2, 60; 11, 100; 1, 150; 2, 200; 1, 400 light; total, 120.—P.

Companies.

Abington and Rockland. 513 meters, with a total capacity of 445 K. W. are in use.

Meters and Transformers in Use June 30, 1906.

Meters. No.	Meters. Capacity in 16 C. P. Lamps.	Transformers. No.	Transformers. Capacity in 16 C. P. Lamps.
352	10	1	12
116	20	2	20
2	30	3	100
23	40	6	150
1	50	2	200
13	80	3	300
5	150	1 light	500
1	240	2 power	500
		3 power	1,000
513		23—A.	

352 10 light; 116, 20; 2, 30; 23, 40; 1, 50; 13, 80; 5, 150; 1, 240. Total, 513 light.—P.

Attleboro. 536 meters of 1,333 K. W. total capacity are in use.

Meters and Transformers in Use June 30, 1906.

Meters. No.	Meters. Capacity in 16 C. P. Lamps.	Transformers. No.	Transformers. Capacity in 16 C. P. Lamps.
339	10	1	10
55	20	33	12
34	30	11	20
30	50	15	30
14	75	4	40
20	100	28	50
17	150	1	90
5	200	16	100
3	300	2	120
11	450	7	150
8	900	11	200
	...	13	300
	...	15	500
	...	5	1,000
536		162—A.	

339, 10 light; 55, 20; 34, 30; 30, 50; 14, 75; 20, 100 light; 17, 150; 5, 200; 13, 300; 11, 450; 8, 900; total, 536.—P.

Beverly. 553 alternating current meters are in use, with a total capacity of 732.7 K. W.

Meters and Transformers in Use June 30, 1906.

Meters. No.	Meters. Capacity in 16 C. P. Lamps.	Transformers. No.	Transformers. Capacity in 16 C. P. Lamps.
1	5	1	8
34	6	1	10
269	10	71	12

Meters.		*Transformers.*	
No.	*Capacity in* 16 *C. P. Lamps.*	*No.*	*Capacity in* 16 *C. P. Lamps.*
3	15	43	20
98	20	45	30
48	30	33	50
1	40	8	60
41	50	17	80
17	60	1	90
31	100	5	100
2	150	2	120
6	200	15	150
2	300	3	300
..	...	2	600
553		247—A.	

1 of 5 light; 34 of 6; 269 of 10; 3 of 15; 98 of 20; 48 of 30; 1 of 40; 41 of 50; 17 of 60; 31 of 100; 2 of 150; 6 of 200; 2 of 300; total, 553.—P.

Fitchburg. 534 meters, 676.5 K. W. total capacity are in use.

Meters and Transformers in Use June 30, 1906.

Meters.		*Transformers.*	
No.	*Capacity in* 16 *C. P. Lamps.*	*No.*	*Capacity in* 16 *C. P. Lamps.*
53	5	17	20
159	10	1	30
77	15	8	40
168	20	17	60
30	40	7	100
21	60	4	150
12	100	8	200
10	200	4	300
1	300	8	500
3	400	..	...
534		74—A.	

5 light, 53; 10, 159; 15, 77; 20, 168; 40, 30; 60, 21; 100, 12; 200, 10; 300, 1; 400, 3; total, 534; all alternating current.—P.

Gardner. 455 meters of 587 K. W. total capacity are in use.

Meters and Transformers in Use June 30, 1906.

Meters.		*Transformers.*	
No.	*Capacity in* 16 *C. P. Lamps.*	*No.*	*Capacity in* 16 *C. P. Lamps.*
117	10	35	20
232	20	27	30
29	30	5	40
18	40	25	50
34	50	17	60
9	60	1	70

Meters.		Transformers.	
No.	Capacity in 16 C. P. Lamps.	No.	Capacity in 16 C. P. Lamps.
11	100	1	75
2	150	2	80
2	200	1	90
1	300	4	100
..	...	5	150
..	...	6	200
..	...	1	240
..	...	1	300
455		131—A.	

—P.

Northampton. 591 A. C. and D. C. meters of 5 to 400 lamp capacity each on the basis of 50 watts per lamp. 591 meters of 760 K. W. total capacity are in use.

Meters and Transformers in Use June 30, 1906.

Meters.		Transformers.	
No.	Capacity in 16 C. P. Lamps.	No.	Capacity in 16 C. P. Lamps.
35	5	1	10
253	10	12	12
17	15	5	15
161	20	19	20
16	25	2	25
34	30	16	30
10	40	3	40
22	50	16	50
7	80	8	60
15	100	1	75
1	120	3	80
12	150	4	90
1	125	11	100
4	200	15	150
3	400	7	200
..	...	1	240
..	...	5	300
591		129—A.	

35, 5; 253, 10; 17, 15; 161, 20; 16, 25; 34, 30 light; 10, 40; 22, 50; 7, 80; 15, 100; 1, 120; 12, 150; 1, 125; 4, 200; 3, 400; 591 total.—P.

(The above figures are reproduced as they appear in the original. Apparently the first column indicates the number of meters and the second column the number of lights.—Gray.)

Salem. 2,105 meters are in use. Total capacity, 3,412.2 K. W.

Meters and Transformers in Use June 30, 1906.

Meters.		*Transformers.*	
No.	*Capacity in 16 C. P. Lamps.*	*No.*	*Capacity in 16 C. P. Lamps.*
189	6	63	12
1,048	10	25	20
13	250	28	30
443	20	4	40
5	400	18	50
136	30	14	60
13	40	4 power	
86	50	20	80
33	60	21	100
1	1,000	2 power	
5	1,200	12	150
82	100	8 power	
3	120	12	200
13	150	7	300
25	200	5 power	
2	300	11	400
1	4,500	3 power	500
1	750	5	600
3	500	3	800
3	600		
2,105		265—A.	

189 of 6 light; 1,049 of 10; 443 of 20; 136 of 30; 13 of 40; 86 of 50; 33 of 60; 82 of 100; 3 of 120; 13 of 150; 25 of 200; 13 of 250; 2 of 300; 5 of 400; 3 of 500; 1 of 750; 1 of 1,000; 5 of 1,200; 1 of 4,500; total, 2,102.—P.

Uxbridge and *Northbridge.* 282 meters of ——— K. W. capacity.

Meters and Transformers in Use June 30, 1906.

Meters.		*Transformers.*	
No.	*Capacity in 16 C. P. Lamps.*	*No.*	*Capacity in 16 C. P. Lamps.*
147	10	2	10
70	20	8	12
21	30	1	15
23	40	19	20
4	50	4	30
5	80	2	40
2	100	2	50
4	160	2	60
3	200	10	80

Meters.		*Transformers.*	
No.	*Capacity in 16 C. P. Lamps.*	*No.*	*Capacity in 16 C. P. Lamps.*
1...25 ampere	220 volt polyphase	2	90
1...50 "	550 " "	10	100
1...30 "	1,100 " "	2	150
.. ..	...	10	200
.. ..	...	2	400
282		76—A.	

H 17. Transformers—line.

Municipalities.

Chicopee. There are 165 transformers with a total capacity of 438.1 K. W. Transformers added since June 30, 1897, number 211.

Number of transformers added each year: 1906, 23; 1905, 23; 1904, 22; 1903, 14; 1902, 29; 1901, 43; 1900, 20; 1899, 24; 1898, 13.

Transformers in use, June 30, 1906: 26 of 12 sixteen C. P. lamps capacity each; 36 of 20; 38 of 30; 23 of 50; 8 of 60; 17 of 80; 4 of 100; 4 of 150; 5 of 200; 2 of 300; 2 of 500; total, 165.—A.

26, 12 light; 36, 20; 38, 30; 23, 50; 8, 60; 17, 80; 4, 100; 4, 150; 5, 200; 2, 300; 2, 500; total, 165.—P.

Danvers. Mostly oil transformers. 118 transformers with a total capacity of 384.5 K. W. are in use.

119 transformers added since June 30, 1897.

Transformers in Use June 30, 1906.

Number.	*Capacity of each in 16 C. P. lamps.*
6............	10
15............	15
21............	20
10............	30
23............	40
6............	50
6............	60
3............	75
9............	80
3............	100
2............	150
6............	200
1............	300
2............	400
2............	600
118	—A.

6, 10 light; 15, 15; 21, 20; 10, 30; 23, 40; 6, 50; 6, 60; 3, 75; 9, 80; 3, 100; 2, 150; 6, 200; 1, 300; 2, 400; 2, 600; total, 118.—P.

Holyoke. 95 transformers with a total capacity of 1,757 K. W. are in use.

Transformers added since June 30, 1896, number 100. (See H 16.)—A.

1, 40 lamp; 8, 50 lamp; 1, 60 lamp; 8, 80 lamp; 10, 100 lamp; 6, 150 lamp; 5, 200 lamp; 29, 300 lamp; 3, 400 lamp; (A.) the G. E. Co., 2,300 voltage; 5, 500 lamp; 12, 600 lamp; 1, 1,000 lamp; 3, 1,500 lamp; 3, 2,000 lamp; total, 95.—P.

Marblehead. 130 transformers with total capacity of 330½ K. W. are in use.

Transformers added since June 30, 1895, number 144. (See H 16.)—A.

25, 10 light; 10, 12 light; 7, 15 light; 29, 20 light; 13, 30 light; 2, 40 light; 18, 50; 7, 75; 2, 80; 2, 100; 4, 125 light; 2, 150 light; 2, 175; 1, 200; 1, 250; 4, 300; 1, 500; total, 130 = 330 K. W.—P.

North Attleboro. 132 transformers of .5 to 15 K. W. individual capacity, and 472 K. W. total capacity, operating between 1,000 and 110 or 50 volts, at 125 cycles.

146 transformers added since June 30, 1895. (See H 16.)—A.

6, 10; 43, 15; 1, 20; 20, 25; 1, 30; 14, 40; 1, 50; 1, 60; 2, 90; 9, 100; 14, 150; 6, 200; 4, 250; 5, 300; total, 132.—P.

Peabody. There are 145 transformers with a total capacity of 426.6 K. W.

138 transformers added since June 30, 1900.

Most transformers are Westinghouse or General Electric oil type. (See H 16.)—A.

1, 6; 11, 10; 2, 12; 1, 14; 1, 15; 46, 20; 2, 24; 1, 25; 5, 30; 14, 40; 19, 50; 11, 60; 7, 80; 5, 100; 1, 140; 4, 150; 11, 200; 1, 250; 1, 500; total, 144.—P.

Taunton. 208 transformers with a total capacity of 1,095.4, are in use.

145 transformers added since June 30, 1897. (See H 16.)—A.

Transformers.	*Voltage* 2,300	
19 oil type	6-10	K. W.
29	1	“
39	1½	“
15	2½	“
20	3	“
19	4	“
11	5	“
3	6	“
24	7½	“
10	10	“
7	15	“
3	20	“
5	25	“
1	30	“
3	50	“
208		—P.

Westfield. 35 transformers of 206.6 K. W. total capacity are in use.

34 transformers added since June 30, 1903.

Transformer List.

Number of each size.	*Capacity in 50 watt lamps.*
1	12
2	20
1	50
9	60
3	80
3	100
7	150
8	200
1	300
35	

(See H 16.)—A.

1, 12 light; 2, 20; 1, 50; 9, 60; 3, 80; 3, 100 light; 7, 150; 8 200; 1, 300; total, 35.—P.

Companies.

Abington and *Rockland.* 23 transformers with a total capacity of 352.6 K. W. are in use. See also H 16.—A.

1, 12 light; 2, 20 light; 3, 100 light; 6, 150 light; 2, 200 light; 3, 300; 3, 500; 3, 1,000; total, 23.—P.

Attleboro. 162 transformers with a total capacity of 1,210.8 K. W. are in use. (See H 16.)—A.

1, 10 light; 33, 12; 11, 20; 15, 30; 4, 40; 28, 50 light; 1, 90; 16, 100; 2, 120; 7, 150; 11, 200 light; 13, 300; 15, 500; 5, 1,000; total, 162.—P.

Beverly. 247 transformers with a total capacity of 587.5 K. W. are in use. (See H 16.)—A.

1, 8 light; 1, 10 light; 71, 12 light; 43, 20 light; 45, 30 light; 33, 50 light; 8, 60; 17, 80; 1, 90; 5, 100; 2, 120; 15, 150; 3, 300; 2, 600; total, 247.—P.

Fitchburg. 74 transformers of 190.5 K. W. total capacity are in use. (See H 16.)—A.

17, 20 light; 1, 30 light; 8, 40 light; 17, 60 light; 7, 100 light; 4, 150 light; 8, 200 light; 4, 300 light; 8, 500 light; total, 74.—P.

Gardner. 131 transformers of 363.2 K. W. total capacity are in use. (See H 16.)—A.

35, 20 light; 27, 30 light; 5, 40 light; 25, 50 light; 17, 60 light; 1, 70 light; 1, 75 light; 2, 80 light; 1, 90 light; 4, 100 light; 5, 150 light; 6, 200 light; 1, 240 light; 1, 300 light; total, 131 = 363 K. W.—P.

Northampton. 129 transformers of 10 to 300 lamp capacity each, on a basis of 50 watts per lamp. Total transformer capacity, 185.2 K. W. (See H 16.)—A.

1, 10 light; 12, 12; 5, 15; 19, 20; 2, 25; 16, 30; 3, 40; 16, 50; 8, 60; 1, 75; 3, 80; 4, 90; 11, 100; 15, 150; 7, 200; 1, 240; 5, 300; total, 129.—P.

Salem. 265 transformers of 1,421.8 K. W. total capacity are in use. (See H 16.)—A.

63, 12 light; 25, 20; 28, 30; 4, 40; 18, 50; 18, 60 light; 20, 80; 23, 100; 12, 200; 12, 300; 11, 400 light; 3, 500; 3, 800; 5, 600; total, 265.—P.

Uxbridge and *Northbridge.* 76 transformers of K. W. total capacity. See also H 16.—A.

H 18. Other appliances, number and kind.

Municipalities.

Chicopee and *Westfield* have switchboards with indicating but no recording meters.—A. ———— —P.

Danvers, Holyoke, North Attleboro, Peabody, Taunton and *Marblehead* have switchboards with indicating and recording meters.—A.

Companies.

Abington and *Rockland, Gardner.* Switchboard with indicating and recording meters.—A. ———— —P.

Attleboro. Switchboard of marble and wood, with indicating and recording meters.—A. ———— —P.

Beverly. A switchboard of marble with oil switches and indicating and recording meters.—A. ———— —P.

Fitchburg. Switchboard of marble with switches and indicating and recording meters.—A. ———— —P.

Northampton. Switchboard with indicating but no recording meters.—A. ———— —P.

Uxbridge and *Northbridge.* Switchboard with indicating and recording meters.—A. ———— —P.

Salem. Switchboard of marble with indicating and recording meters.—A. ———— —P.

APPRAISAL OF PLANTS.

Municipalities.

Chicopee.

H 19. As of date, end of fiscal year June 30, 1906.

		A.	P.
H 20-21. Land (real estate.—A.)		$16,754 70	....
H 20 a. Land (3 acres, plant.—P.)		....	$1,000 00
H 21. Buildings (plant)		....	19,680 00
H 22-23. Steam engine, steam plant, boilers		33,188 90	....
H 22 a. Steam engines		....	17,000 00
H 23. Boilers		....	6,480 00
H 24-25 ————		....	....
H 26. Auxiliary apparatus		....	10,728 00
H 27. Dynamos (and electric plant.—A.)		14,633 57	....
H 27 a. Dynamos		....	12,068 00
H 28. ————		....	....
H 29. Transformers		6,801 05	....
(a) Station	$400 00		
(b) Line	7,270 00		
		....	7,670 00
H 30. Lines overhead		20,254 06	15,421 00
H 31. Arc lamps		7,143 29	6,132 00
H 32-33. ————		....	....
H 34. Meters		5,827 13	6,146 00
H 35. Other appliances (office furniture.)		81 12	....
H 36. Teams, tools and other accessories		3,501 24	3,501 00
H 37. Total appraised value		$108,185 06	$105,826 00

The values in the above appraisal are taken from the report of assets made by the municipality to the Gas and Electric Light Commissioners, June 30, 1906.—A. and P.

Under the rules of the Commissioners, depreciation of municipal plants is computed at 5 per cent. yearly, and the reported values represent the costs minus depreciation charges.—A.

Appraisal of the Municipal Electric Plant, Chicopee, Mass., as of June 30, 1906.

Land at station	$4,000.00
Station and chimney	20,625.00
Steam engines	11,760.00
Boilers	3,920.00
Auxiliary apparatus	10,240.00
Dynamos and switchboards	6,200.00
Station transformers	408.00
Line transformers	5,455.00
Overhead lines	12,795.00
Arc lamps and supports	3,741.00
Incandescent lamps	1,085.00
Meters for consumers	5,558.00
Teams, tools and accessories	1,850.00
	$87,637.00
Engineering and interest, 7 per cent	6,134.00
Total structural value	$93,771.00—A.

CONSUMPTION.

Chicopee.

H 38. Total number of services (number of consumers.—A.) 430.

H 39. Total number of services metered (number of meters—A.) 436.—A. 420.—P.

For questions H 40 to H 60, inclusive, Adams answers "No record." Prichard makes the same answer except as follows:

H 42. Total current bought during year. None.

H 54. Current sold for public power. None.

H 55. Current sold for commercial power. 71,027 K. W. H.

H 56. Current sold for street railway power. None.

H 57. ————

H 58. Maximum daily output, 83 amperes, Nov. 17, 1905.

H 59. Minimum daily output, 17 amperes, July 9, 1905.

H 60. ————

H 61. Number of consumers who use commercial arc lights, 45.—A. and P.

H 62. Number of consumers who use incandescent lights, 426.

H 63. Number of consumers who use electric power, and total H. P. 7 motors of 61.5 total H. P.—A. 4 of 61.5 H. P.—P.

H 64. Total number of different consumers, 430.

H 65. Arc lamps in use—commercial service.

Alternating current. Enclosed: 64 with 6 amperes each. 24 with 4 amperes each.—A. and P.

Prices for commercial arc lamps by contract are $2.75 to $6.25 per month, according to the ampere capacity of the lamp and the hours of operation.—A.

H 66. Arc lamps in use—public lighting.

(a) Direct current. Open: 145 arc lamps, 6.8 amperes, operating 2,999 hours.—A. and P. $75.00 per year.—P.

(b) Alternating current. Open: ———— Enclosed: 52 lamps 6.6 amperes, 2,999 hours.—A. and P. $75.00.—P. For street lighting.—A.

7 enclosed arc lamps with 6 amperes each were used in the electric station. During the year these 197 open and enclosed arc street lamps give 567,512 lamp hours of service.—A.

H 67. Incandescent lamps connected—public and private.

9,690 16 candle power commercial incandescent lamps; total K. W. capacity 484.5. Also 49 incandescent lamps of 16 candle power each, operating in the electric station. The lamps were operated with alternating current. Total K. W. capacity of incandescent lamps, 487.—A.

9,739 incandescent lamps, 16 candle power, alternating current.—P.

Danvers.

APPRAISAL OF PLANT.

H 19. As of date end of fiscal year June 30, 1906.—A.

	A.	P.
H 20 and H 21. Land and buildings (real estate.—A.)	$9,742 25	....
H 20 (a). Land. (P. plant)	....	$400 00
H 21. Buildings (a) plant	....	7,844 00
H 22. Steam engines, steam plant boilers	18,880 96	....
H 22 (a). Steam engines	....	13,160 00
H 23. Boilers	....	6,075 00
H 24-25. ————	....	....
H 26. Auxiliary apparatus	....	3,740 00
H 27. Dynamos (and electric plant.—A.)	7,423 33	....
H 27 (a). Dynamos	....	7,476 00
H 28. ————	....	....
H 29. Transformers (line P.)	4,470 00	5,479 00
H 30. Lines overhead	13,425 08	18,251 00
H 31. Arc lamps	4,499 19	3,672 00
H 32. Incandescent lamps	....	236 00
H 33. ————	....	....
H 34. Meters	6,637 64	5,365 00
H 35. Office furniture	76 00	....
H 36. Teams, tools and other accessories	809 24	809 00
H 37. Total appraised value	$65,963 69	$72,507 00

The values in the above appraisal are taken from the report of assets of the municipal gas and electric light commissioners, June 30, 1906. Under the rules of the Commissioners, depreciation of municipal plants is computed at 5 per cent. yearly, and the reported values represent the costs minus depreciation charges.—A.

Appraisal of the Municipal Electric Plant, Danvers, Mass., as of June 30, 1906.

Land at station	$1,306.00
Station and chimney	7,350.00
Steam engine	7,777.00
Boilers	3,526.00
Auxiliary apparatus	7,478.00
Dynamos and switchboard	4,510.00
Line transformers	4,141.00
Overhead lines	13,877.00
Arc lamps and supports	3,277.00
Incandescent lamps and supports	80.00
Meters for consumers	5,129.00
Teams, tools and accessories	1,000.00
	$59,401.00
Engineering and interest, 7 per cent	4,158.00
Total structural value	$63,559.00—A.

CONSUMPTION.

H 38. Total number of services (number of consumers.—A.) 460.

H 39. Total number of services metered (number of meters.—A.) 438.

H 40. ——————

H 41. Total current delivered at switchboard during year, 471,114 K. W. H.—A. —————— —P.

(a) Alternating current, 402,178 K. W. H.—A. 471,114 K. W. H.—P.

(b) Direct current, 68,936 K. W. H.—A. —————— —P.

H 42. Total current bought during year —————— —A. None.—P.

H 43. Total current to be accounted for, 471,114 K. W. H.

H 44. Current sold during year (and used—A.). 360,971 K. W. H.

H 45. Current used at works and office —————— —A. Unknown.—P.

H 46. Current supplied free ——————.

H 47. Current unaccounted for, 110,143 K. W. H.

H 48. Total, 471,114 K. W. H.

H 49. Current sold for private arc lights unmetered. None.—P.

H 50. Current sold for private incandescent lights unmetered. None.—P.

H 51. Current sold for private lighting, metered. 116,004 K. W. H.—A. 119,669 K. W. H.—P.

H 52. Current sold for public arc lights —————— —A. 68,936 K. W. H.—P.

(a) Current for public arc lights used at S. B. 68,936 K. W. H.—A.

H 53. Current for public incandescent lights in buildings. 3,665 K. W. H.—A. —————— —P.

H 54. Current sold for public power ———— —A. None.—P.

H 55. Current sold for commercial power, 172,366 K. W. H.

H 56. Current sold for street railway power ———— —A. None.—P.

H 57. Total current sold (and used—A.), 360,971 K. W. H.

H 58, 59, 60 ————

H 61. Number of consumers who used commercial arc lights, 3.—A. 2.—P.

H 62. Number of consumers who used incandescent lights, 460.

H 63. Number of consumers who used electric power, and total connected H. P. 14 motors, 103.5 H. P.—A. 14 consumers, 103.5 H. P.—P.

H 64. Total number of different consumers, 460.

H 65. Arc lamps in use, commercial service. Only 6 commercial arc lamps in use, and each of these operates with 6 amperes alternating current, and is enclosed. The rate is 10 cents per K. W. H. by meter.—A. 6 commercial arc enclosed lamps, with alternating current.—P.

H 66. Arc lamps in use, public lighting. 130 public arc lamps are in use. Each, enclosed, operating with 6.6 amperes and about 500 watts, direct current, 1,621 hours. Total lamp hours of service, 202,354.—A. 130 1,200 C. P. enclosed arc lamps, 6.6—70 r. amperes, operating 1,621 hours.—P.

H 67. Incandescent lamps connected, public and private. 45 direct current 25 C. P. street lamps; 9,361 incandescent lamps of 16 C. P., including those in public buildings, 43 are in use in the station. 45 incandescent street lamps operating 1,621 hours, giving 5,863½ lamp hours. Total load of incandescent lamps, 472 K. W.—A. 9,588 incandescent lamps, alternating current, 16 3½ C. P. or watts.—P.

Holyoke.

APPRAISAL OF PLANT.

H 19. As of date end of last fiscal year June 30, 1906.

		A.	P.
H 20, 21. Land and buildings (real estate.—A.)		$107,956 30	....
H 20 (a). Land (plant 41,289 sq. ft.—P.).....		....	$100,000 00
H 21. Buildings (plant.—P.)................		....	39,446 00
H 22. Steam engine, boilers, steam plant......		83,248 89	....
H 22 (a). Steam engines....................		....	28,000 00
H 23. Boilers................................		....	21,870 00
H 24. Water power plant......................		17,233 91	96,000 00
H 25. ————		....	....
H 26. Auxiliary apparatus....................		....	24,064 00
H 27. Dynamos (electric plant.—A.)..........		141,112 64	40,600 00
H 28. ————		....	....
H 29. Transformers		14,304 88	....
(a) Station	$4,050 00		
(b) Line	20,832 00		
		....	24,882 00
H 30. Lines overhead.........................		56,280 32	34,213 00
H 31. Arc Lamps..............................		21,809 37	20,760 00
H 32. Incandescent lamps.....................		....	220 00

		A.	P.
H 33.	————	....	....
H 34.	Meters	$14,278 04	$7,601 00
H 35.	Other appliances—office furniture	2,100 00	....
H 36.	Tools, teams and other accessories	4,286 27	3,000 00
H 37.	Total appraised value	$462,610 62	$440,658 00

The values above given are taken from the report of assets made by the municipality to the Gas and Electric Light Commissioners, June 30, 1906. Under the rules of the Commissioners, depreciation of municipal plants is computed at 5 per cent. yearly, and the reported values represent the costs minus depreciation charges.—A.

Appraisal of Municipal Electric Plant, Holyoke, as of June 30, 1906.

Land at station	$6,193.00
Station and chimney	31,369.00
Water power plant and its auxiliary steam engines	32,076.00
Boilers	9,664.00
Auxiliary apparatus	7,536.00
Dynamos, with turbine engine and switchboard	45,900.00
Station transformers	3,872.00
Line transformers	13,826.00
Overhead lines	25,223.00
Arc lamps and supports	17,492.00
Incandescent lamps and supports	68.00
Meters for consumers	10,769.00
Teams, tools and accessories	2,670.00
	$206,658.00
Engineering and interest, 7 per cent	14,466.00
	$221,124.00—A.

CONSUMPTION.

H 38. Total number of services (number customers.—A.) 616.—A. (a) Gas, 6,411; (b) electricity, 685.—P.

H 39. Total number of services metered (number of meters.—A.), 587.—A. Gas, 6,411; electric, 587; 198 contract.—P.

H 40. ————

H 41. Total current delivered at switchboard during year: 3,142,800 K. W. H.—A. 3,142,840 K. W. H.—P.

(a) Alternating current. Nearly all.—A. 3,015,070 K. W. H.—P.

(b) Direct current ———— —A. 127,770 K. W. H.—P.

H 42. ————

H 43. Total current to be accounted for, 3,142,800 K. W. H.—A. 3,142,840 K. W. H.—P.

H 44. Current sold during year (per meters of consumers—A.), 1,808,480 K. W. H.—A. 2,736,667 K. W. H.—P.

H 45. Current used for street lamps, 842,400 K. W. H.—A. ———————— —P.

H 45a. Current used at works and offices ———————————— —A. Unknown.—P.

H 46. Estimated amount of direct current sold for power, 87,787 K. W. H.—A.

H 47. Current unaccounted for, 406,133 K. W. H.—A. 406,133 K. W. H.—P.

H 48. Total, 3,142,800.—A. 3,142,840.—P.

H 49, 50, 51. Current sold for private arc and incandescent lights, metered and unmetered, and current sold for private lighting, metered ———————— —A. 495,479 K. W. H.—P.

H 51a. Current sold for private lighting, metered, 495,479.—A. ———————— —P.

H 52. Current sold for public arc lights and for public incandescent lights at switchboard —————————— —A. 842,400 K. W. H.—P.

H 52a. Current used for public arc and incandescent street lights, 842,400 K. W. H.—A. ———————— —P.

H 54. ————————

H 55. Current sold for commercial power, 1,311,001 K. W. H. by meter, and 87,788 K. W. H. estimated.

H 56. ————————

H 57. Total current sold (and used—A.), 2,736,667 K. W. H.

H 58. Maximum daily output ———————— —A. Dec. 21, 1905, 13,310 K. W. H.—P.

H 59. Minimum daily output ———————— —A. July 16, 1905, 2,790 K. W. H.—P.

H 60. Average output per hour every day of year ———————— —A. No record.—P.

H 61. Number of consumers who used commercial arc lights, 110.

H 62. Number of consumers who used incandescent lights, 535.

H 63. Number of consumers who used electric power, and total connected H. P. 135 motors of 1,524½ total H. P. capacity.—A. 59 consumers, 1,524½ H. P., 135 motors.—P.

H 64. Total number of different consumers, 616.—A. 685.—P.

H 65. Arc lamps in use. Commercial service. 342 enclosed arc lamps operating with 6 amperes. 2 enclosed arc lamps operating with 6.6 amperes. Total, 344 enclosed arc lamps. Price for arc lamp service is 10 cents net per K. W. H. by meter. Also contract rates.—A. 359 enclosed arc lamps, 6 amperes.—P.

H 66. Arc lamps in use, public lighting. 494 to 503 enclosed arc lamps in use in streets, giving 1,941,190 lamp hours of service during the year. Alternating current. Arc street lamps operated 3,914 hours. 503 enclosed arcs with 6.6 amperes and 15 enclosed arcs with 6 amperes. Total enclosed arcs, 518.—A. 503 enclosed arcs operating 6.6 amperes, alternating current, 3,914 hours per year, at $80 per year.—P.

H 67. Incandescent lamps connected—public and private. The public lamps, including 15 of 30 candle power, 2 of 32 candle power and 129 of 16 candle power, represent 8,150 watt capacity. The private lamps include 8 of 30 candle power and 16,092 of 16 candle power, representing about 805,400 watt capacity. Incandescent street lamps to the number of 42, operating 3,914 hours, give 164,288 lamp hours. Total connected load of incandescent lamps, 813 K. W.—A. 17,000 incandescent lamps, alternating current, 16 C. P., 3½ w. with total watt capacity of 952.—P.

Marblehead.

APPRAISAL OF PLANT.

H 19. As of date end of last fiscal year June 30, 1906.—A.

		A.	P.
H 20. Land and buildings (real estate.—A.)		$21,690 03	....
(a) Land	$8,650 00		
(b) Buildings	14,144 00		
		....	$22,794 00
H 22. Steam engines, boiler, steam plant		12,495 68	....
Steam engines	$7,595 00		
Boilers	3,900 00		
		....	11,495 00
H 24-25. ————		....	....
H 26. Auxiliary apparatus		....	3,307 00
H 27. Dynamos (and electric plant.—A.)		8,455 47	9,221 00
H 28. ————		....	....
H 29. Transformers (line.—P.)		6,124 09	4,756 00
H 30. Lines overhead		18,034 30	20,570 00
H 31. Arc lamps		1,196 70	2,730 00
H 32. Incandescent lamps (street.—A.)		73 30	313 00
H 33. ————		....	....
H 34. Meters		6,484 83	6,972 00
H 35. ————		....	....
H 36. Teams, tools and other accessories		862 87	863 00
H 37. Total appraised value		$78,117 27	$82,521 00

The values in the above appraisal are taken from the report of assets made by the municipality to the Gas and Electric Light Commissioners, June 30, 1906.—A. and P.

Under the rules of the Commissioners, depreciation of municipal plants is computed at 5 per cent. yearly, and the reported values represent the costs minus depreciation charges.—A.

Appraisal of the Municipal Electric Plant, Marblehead, Mass., as of June 30, 1906.

Land and wharf at station	$13,000.00
Station and chimney	15,978.00
Steam engines	4,200.00
Boilers	2,346.00
Auxiliary apparatus	4,262.00
Dynamos and switchboards	4,836.00
Line transformers	3,582.00
Overhead lines	13,575.00
Underground lines	5,376.00
Arc lamps and supports	1,676.00

Incandescent lamps and supports	$120.00
Meters for consumers	7,037.00
Teams, tools and accessories	750.00
	$76,738.00
Engineering and interest, 7 per cent	5,371.00
Total structural value	$82,109.00—A.

CONSUMPTION.

		A.	P.
H 38. Total number of services (number of consumers.—A.)		677	677
H 39. Total number of services metered (number of meters.—A.)		664	677
H 40. ————		....	....
		K. W. H.	K. W. H.
H 41. Total current delivered at switchboard during year		....	383,605 (est.)
(a) Alternating current, station meters	213,046		
(b) Direct current, estimated	170,559		
		383,605	
H 42. ————		....	....
H 43. Total current to be accounted for		383,605	....
H 44. Current sold during year, measured at S. B.: no record of consumers' meters		213,046	....
Customers' meters and estimated street lights		....	383,605
H 45 Current used for street lamps, estimated		170,559	....
H 45 a. Current used at works and office		....	Unknown
H 46. Current supplied free (public buildings.—P.)		....	....
H 47. ————		....	....
H 48. Total		383,605	....

Mr. Adams answered for H 49 to H 57, inclusive, "No record."

	A.	P.
		K. W. H.
H 49-50. ——. H 51 Current sold for private lighting, metered (Customers' meters.—P.)	....	213,046
H 52-53. Current sold for public arc and incandescent lights. (Est.—P.)	....	170,559
H 54-55. ————	....	....
H 56. Current sold for street railway power	....	None.
H 57. Total current sold	....	383,605
		K. W. H.
H 58. Maximum load, September 3, 1905	....	169 Amp.
H 59. Minimum load, April 17, 1906	....	62 "
H 60. Average output per hour, for each hour of the day	....	Unknown.
H 61. Number of consumers who used commercial arc lights	9	9
H 62. Number of consumers who used incandescent lights	677	677
H 63. Number of consumers who used electric power, and total connected H. P	None.	None.
H 64. ————	....	....

H 65. Arc lamps in use—commercial service. 11 enclosed arc lamps operating with 4 to 6 amperes each, alternating current. Prices for service of commercial arc lamps are 10 cents net per K. W. H.—A. 11 enclosed arc lamps, alternating current, 6 to 700 (C. P. ?) 6 amperes, on meter, 15 cents K. W. H.—P.

H 66. Arc lamps in use—public lighting. Street or public arc lamps are of the open type, using 7 amperes each, and number 169 outside of the electric station. In the station there are two such arcs. The street lamps operate 3,189 hours, direct current, during the year. For the 169 street lamps, the lamp hours of service during the year number 191,379. Total number of arc lamps, 171.—A. 70—1,200 C. P.—6.6 amperes, public arc lamps operating 3,189 hours per year, direct current.—P.

H 67. Incandescent lamps connected, public and private. 13 incandescent lamps of 30 C. P. each are operated for public service, with direct current. 38 incandescent lamps of 16 C. P. are operated with alternating current in the station. 45 public incandescent lamps of 25 C. P. each and 10 public incandescent lamps of 16 C. P. each, are operated with alternating current. On June 30, 1906, there were 9,696 commercial incandescent lamps of 16 C. P. each. Total connected load of incandescent lamps, 490 K. W. 69 incandescent street lamps operated 3,189 hours, giving the equivalent of 213,395 lamp hours with 25 C. P. lamps.—A. 9,696 commercial and public incandescent lamps—56 watts each; total watt capacity 543 K. W., and 45 street lamps of 25 C. P. each; eleven lamps of 16 C. P. each and 13 lamps of 30 C. P. each, of alternating current.—P.

North Attleboro.

APPRAISAL OF PLANT.

H 19. As of date end of last fiscal year June 30, 1906.

	A.	P.
H 20. Land (belongs to water department.—P.)	....	$5,000 00
H 20-21. Land and buildings (real estate.—A.)	$8,397 92	....
H 22-23. Steam engines, boilers, steam plant..	17,302 35	....
H 22a. Steam engines........................	....	9,145 00
H 23. Boilers...............................	....	4,133 00
H 24-25.	....	....
H 26. Auxiliary apparatus....................	....	1,916 00
H 27. Dynamos (and electric plant—A.)......	6,758 96	7,252 00
H 28.	....	....
H 29. Transformers (line—P.)...............	5,440 28	6,696 00
H 30. Lines (overhead—A.)..................	15,986 81	21,306 00
H 31. Arc lamps............................	87 13	315 00
H 32. Incandescent lamps (street—A.)......	186 92	2,758 00
H 33. Motors..............................	....	....
H 34. Meters..............................	4,450 12	3,990 00
H 35. Other appliances (office furniture—A.).	125 52	....
H 36. Teams, tools and other accessories......	508 91	590 00
H 37. Total appraised value................	$59,334 92	$71,068 00

The values in the above appraisal are taken from the report of assets made by the municipality to the Gas and Electric Light Commissioners, June 30, 1906. Under the rules of the Commissioners, depreciation of municipal plants is computed at 5 per cent. yearly, and the reported values represent the costs minus depreciation charges.—A.

Appraisal of the Municipal Electric Plant, North Attleboro, Mass., as of June 30, 1906.

Land at station	$800.00
Station and chimney	8,264 .00
Steam engines	5,580.00
Boilers	3,425.00
Auxiliary apparatus	4,185.00
Dynamos and switchboards	3,762.00
Line transformers	5,227.00
Overhead lines	13,311.00
Arc lamps and supports	196.00
Incandescent lamps and supports	1,093.00
Meters for consumers	3,517.00
Teams, tools and accessories	1,025.00
	$50,385.00
Engineering and interest, 7 per cent	3,526.00
Total structural value	$53,911.00—A.

CONSUMPTION.

	A.	P.
H 38. Total number of services (number of customers.—A.) (including municipal buildings.—P.)	280	280
H 39. Total number of services metered (number of meters.—A.)	285	280
H 40. Percentage of services metered	....	100
	K. W. H.	K. W. H.
H 41. Total current delivered at switchboard during year (alternating current)	284,394	284,394
H 42.	....	....
H 43. Total current to be accounted for	284,394	284,394
H 44. Current sold during year	102,649	102,649
H 45. Current used at works and offices	....	Unknown
H 45 a. Current used in street lamps	81,128	....
H 46. Current supplied free	....	None
H 47. Current unaccounted for	100,617	100,617
H 48. Total	284,394	....
H 49-50.	....	....
H 51. Current sold for private lighting metered	102,649	....
H 52. Current used for public lights, incandescent, street	81,128	....
H 53. Current sold for public incandescent lights	....	81,128
H 54, 55. 56.	....	....
H 57. Total current sold (and used in street lamps.—A)	183,777	183,777
H 58. Maximum daily output and date	....	270 K.W.

	A.	P
H 59. Minimum daily output and date........	....	26 K. W.
H 60. Average output per hour for each hour of the day	....	Unknown
H 61. Number of consumers who used commercial arc lights........	9	9
H 62. Number of consumers who used incandescent lights	280	280
H 63. Number of consumers who used electric power, and total connected H. P............	None	None
H 64. Total number of different consumers....	280	280

H 65. Arc lamps in use—commercial service. Two open arc lamps using 6 amperes each, alternating current, and 13 enclosed arc lamps using 6 amperes each, alternating current. Rate for arc lamps, 15 cents K. W. H.—A. 13 enclosed arc lamps with alternating current operating with 5, 6 and 7 amperes.—P.

H 66. Arc lamps in use—public lighting. None.

H 67. Incandescent lamps connected—public and private. The incandescent street lamps operated 1,571 hours and 5 minutes during the year, and the total lamp hours for the 613 lamps of 32 C. P. each, were 962,103. 613 incandescent street lamps rated at 32 C. P. and 5.75 amperes each were used on alternating current circuits during the year. These 613 lamps represent about 68.7 K. W. 516 incandescent lamps in public buildings and station are 16 C. P. each, and 25.8 K. W. total. 9,730 commercial incandescent lamps of 16 C. P. each, operating with alternating current, and representing 486.5 K. W. Total connected load of incandescent lamps, 581 K. W.—A. 10,183 incandescent lamps of 16 C. P. and total watt capacity of 570,248. Also 613 incandescent lamps of 32 C. P. and total watt capacity of 68,656, all operating with alternating current.—P.

Peabody.

APPRAISAL OF PLANT.

H 19. As of date end of fiscal year June 30, 1906.

		A.	P.
H 20. Land and buildings (real estate.—A.)...		$9,355 69	....
H 20a. Land (plant.—P.)........		....	$2,000 00
H 21. Buildings (plant.—P.)........		....	9,201 00
H 22. Steam engines, boilers, steam plant.....		11,255 80	....
H 22a. Steam engines........		....	7,883 00
H 23. Boilers		....	3,450 00
H 24. Inside wiring........		817 97	....
H 25. ——		....	....
H 26. Auxiliary apparatus........		....	3,145 00
H 27. Dynamos (and electric plant.—A.)......		10,169 28	7,960 00
H 28. ——		....	....
H 29. Transformers		6,148 27	....
(a) Station	$1,600 00		
(b) Line	5,057 00		
		....	6,657 00
H 30. Lines overhead........		14,657 30	2,354 00
H 31. Arc lamps		6,451 84	5,832 00

		A.	P.
H 32.	Incandescent lamps	$616 23	$642 00
H 33.	——	....	....
H 34.	Meters	6,468 82	8,472 00
H 35.	Other appliances (office furniture.—A).	29 20	....
H 36.	Teams, tools and other accessories	600 00	600 00
H 37.	Total appraised value	$66,570 40	$77,196 00

The values in the above appraisal are taken from the report of assets made by the municipality to the Gas and Electric Light Commissioners, June 30, 1906. Under the rules of the Commissioners, depreciation of municipal plants is computed at 5 per cent. yearly, and the reported values represent the costs minus depreciation charges.—A.

Appraisal of the Municipal Electric Plant, Peabody, Mass., as of June 30, 1906.

Land at station	$1,040.00
Station and chimney	7,101.00
Steam engines	3,341.00
Boilers	1,930.00
Auxiliary apparatus	4,499.00
Dynamos and switchboard	5,025.00
Station transformers	1,536.00
Line transformers	5,317.00
Overhead lines	18,313.00
Arc lamps and supports	4,500.00
Incandescent lamps and supports	45.00
Meters for consumers	8,218.00
Teams, tools and accessories	740.00
	$61,605.00
Engineering and interest, 7 per cent	4,312.00
Total structural value	$65,917.00—A.

CONSUMPTION.

		A.	P.
H 38.	Total number of services (customers.—A.)	604	605
H 39.	Total number of services metered (number of meters.—A.)	605	605
H 40.	Percentage of services metered	....	100
		K. W. H.	K. W. H.
H 41.	Total current delivered at switchboard during year (alternating current)	614,374	614,374
H 42.	——	....	....
H 43.	Total current to be accounted for	614,374	614,374
H 44.	Current sold during year	157,862	417,287
H 45.	Current used for street lamps	259,425	....
H 45 a.	Current used at works and office	....	No record
H 46.	——	....	....
H 47.	Current unaccounted for	197,087	197,087
H 48.	Total	614,374	614,374
H 49-50.	——	....	....

	A.	P.
H 51. Current sold for private lighting (metered)	150,460	150,460
H 52-53. Current sold for public arc and incandescent lights.—P.	....	259,425
H 54. ——	....	....
H 55. Current sold for commercial power......	7,402	7,402
H 56. ——	....	....
H 57. Total current sold (and used.—A.).....	417,287	417,287

H 58. Maximum daily output and date. December 23, 1905, 2,882 K. W. H.

H 59. Minimum daily output and date. July 16, 1905, 610 K. W. H.

H 60. ————

H 61. Number of consumers who used commercial arc lights, 12.

H 62. Number of consumers who used incandescent lights, 604.

H 63. Number of consumers who used electric power, and total connected H. P. 23 motors of 46.8 total H. P.—A. 22 consumers, 46 19/24 H. P.—P.

H 64. Total number of different consumers, 604.—A. 605.—P.

H 65. Arc lamps in use—commercial service. 48 enclosed arc lamps operating with 6 amperes of alternating current each. Special contract rates.—A. 48 enclosed arc lamps of 1,200 C. P. Unknown hours of service at regular meter rates.—P.

H 66. Arc lamps in use—public lighting. During the year, 6.6 amperes enclosed arcs operated 3,398.45 hours, and 6 amperes enclosed arcs operated 3,079 hours. The total lamp hours for the 6.6 ampere lamps were 617,314.8, and the total lamp hours for the 6 ampere lamps were 21,553. 181 enclosed arc lamps for public lighting, operating with 6.6 amperes each, and 7 operating with 6 amperes each. 2 enclosed arc lamps operating with 6.6 amperes are in the electric station. (Apparently these lamps are all operated with alternating current.—J. H. G.) Total number of enclosed arcs, 193.—A. 191 enclosed arc lamps, alternating current, 6.6 amperes, 3,399 hours per year.—P.

H 67. Incandescent lamps connected—public and private. All alternating current. 11,900 private incandescent lamps of 16 C. P. each and about 595,000 watts capacity. Public incandescent lamps: 3 of 16 C. P.; 15 of 32 C. P., and 7 of 20 C. P.; total watts, 2,100. In station, 5 of 16 C. P.; 26 of 32 C. P.; total watts, 3,250. Total watts, public and in station, 5,350. Series incandescent street lamps operated 3,398.45 hours, giving 49,223 lamp hours. Multiple incandescent street lamps operated 3,079 hours, giving 12,316 lamp hours. Connected load of incandescent lamps, 600 K. W.—A. 11,900 lamps of 16 C. P., 3½ watts; total watt capacity, 666,400; alternating current.—P.

Taunton.

APPRAISAL OF PLANT.

H 19. As of date end of fiscal year June 30, 1906.

		A.	P.
H 20. Land and buildings, real estate		$66,311 98	....
H 20. Land (plant)		....	$16,000 00
H 21. Buildings (plant)		....	56,925 00
H 22-23. Steam plant, engines and boilers		72,749 33	....
H 22 a. Steam engines		....	36,000 00
H 23 a. Boilers		....	14,580 00
H 24 and 25. ——		....	....
H 26. Auxiliary apparatus		....	4,552 00
H 27. Dynamos (and electric plant.—A.)		41,570 88	22,135 00
H 28. ——		....	....
H 29. Transformers		17,334 45	....
(a) Station	$3,645 00		
(b) Line	13,616 00		
		....	17,269 00
H 30. Lines overhead		35,797 30	25,106 00
H 31. Arc lamps		16,532 23	9,744 00
H 32. Inside wiring		1,473 83	....
H 33. Office furniture		294 99	....
H 34. Meters		6,871 10	4,386 00
H 35. Incandescent lamps		....	840 00
H 36. Other appliances (horses and wagons.—A.)		350 32	....
H 37. Tools and other accessories (teams.—.P.)		4,588 20	4,938 00
H 38. Total appraised value		$263,874 61	$212,467 00

The values in the above appraisal are taken from the report of assets made by the municipality to the Gas and Electric Light Commissioners, June 30, 1906.—A.

Appraisal of Municipal Electric Plant, Taunton, Mass., as of June 30, 1906.

Land and wharf at stations	$14,891.00
Stations and chimneys	44,936.00
Steam engines	24,048.00
Boilers	11,798.00
Auxiliary apparatus	10,540.00
Dynamos and switchboards	27,397.00
Station transformers	3,672.00
Line transformers	9,874.00
Overhead lines	13,027.00
Arc lamps and supports	10,731.00
Incandescent lamps and supports	274.00
Meters for consumers	5,671.00
Teams, tools and accessories	4,800.00
	$181,659.00
Engineering and interest, 7 per cent	12,716.00
Total structural value	$194,375.00—A.

CONSUMPTION.

	A.	P.
H 38. Total number of services (number of consumers.—A.)	334	434
H 39. Total number of services metered (number of meters.—A.)	358	358
H 40.	....	....
	K. W. H.	K. W. H.
H 41. Total current delivered at switchboard during the year (alternating current.—A.)	1,769,370	1,769,370
H 42.	....	....
H 43. Total current to be accounted for	1,769,370	1,769,370
H 44. Current sold during the year	827,034	1,336,136
H 45. Current used at works and offices	....	Unknown
H 45. a. Current used for street lamps	492,787	....
H 45 b. Current used in public buildings	16,318	....
H 46. Current supplied free	....	None
H 47. Current unaccounted for	433,231	433,234
H 48. Total	1,769,370	1,769,370
H 49. Current sold for private arc lights unmetered (est.—A.)	26,000	26,000
H 50. Current sold for private incandescent lamps, unmetered (est.—A.)	23,300	23,000
H 51. Current sold for private lighting (metered)	211,000	211,000
H 52 and 53. Current sold for public arc and incandescent lights	....	492,784
H 52 a. Current used for street lamps	492,787	....
H 52 b. Current used for public buildings	16,318	16,318
H 54. Current sold for commercial power (est.—A.) (unmetered.—P.)	128,350	128,350
H 55. Current sold for commercial power (meters.—A.)	438,384	438,384
H 56. Current sold for public buildings	....	16,318
H 57. Total current sold (and used.—A.)	1,336,139	1,336,136
H 58. Maximum daily output, Dec. 18, 1905	675 K. W. load.	675 K.W.
H 59. Minimum daily output, July 4, 1905	225 K. W. load.	225 K.W.
H 60. Average output per hour for each hour of the day	....	Unknown
H 61. Number of consumers who used commercial arc lights	26	26
H 62. Number of consumers who used incandescent lights	317	317
H 63. Number of consumers who used electric power and total connected H. P.	76 motors 969 H. P.	52 consumers 969 H. P.
H 64. Total number of different consumers	334	317

H 65. Arc lamps in use—commercial service. 52 enclosed arc lamps with 6.6 amperes direct current. 77 enclosed arcs with alternating current using 6 amperes each, and 10 lamps using 7½ amperes each. Commercial contract rates are as follows: 1 arc every night, $7.00 per month. Several arc lamps every night, $6.00 each per month. Service 3 nights per week, $4.00 per lamp, per month. Total arc lamps, 139 enclosed.—A. 52 enclosed arc lamps, 1,200 C. P., 6.6 amperes series, $7.00 per month each for seven nights per week. More than 1 lamp, $6.00 per month. 3 nights per week, $4.00 per month. On a. c. circuits at regular meter rates. 69 enclosed arc lamps a. c., 1,200 C. P., 6 amperes multiple. 10 enclosed lamps a. c., 1,600 C. P., 7.5 amperes multiple. Total enclosed arc lamps, 131.—P.

H 66. Arc lamps in use—public lighting. Public arc lamps are all of the enclosed type and operated with 6.6 amperes each, a. c. On June 30, 1896, (?) the number of these public arc lamps was 267, but the number varied during the year. Street lamps were operated 3,778 hours during the year. The total lamp hours of service with 6.6 amperes, enclosed arc lamps, amounted to 1,003,189. Total enclosed arc lamps, 267.—A. 267 enclosed arc lamps of 1,200 C. P. and 6.6 amperes operating 3,778 hours per year with a. c.—P.

H 67. Incandescent lamps connected—public and private. 160 incandescent lamps of 25 C. P. and operating with 6.6 amperes a. c. are used on the streets, and 20 lamps of 16 C. P. are used in the electric substation. These 180 lamps represent a capacity of 15 K. W. 160 incandescent street lamps, operated 517,602 lamp hours. 12,220 commercial lamps of 16 C. P. have a capacity of about 611 K. W. and are operated with a. c. Total connected load of incandescent lamps, 626 K. W.—A. 160 incandescent street lamps, a. c., 25 C. P.; total watt capacity, 14; 12,220, 3½ to 16 C. P. incandescent commercial lamps, a. c., with a total watt capacity of 684.3.—P.

Westfield.

APPRAISAL OF PLANT.

H 19. As of date end of fiscal year June 30, 1906.

		A.	P.
H 20-21. Real estate, lands and buildings		$8,525 35	....
H 20. Land (plant)		....	1.6 acres $250 00
H 21. Buildings (38x100 ft., brick)		....	7,460 00
H 22-23. Steam plant, engines and boilers		12,918 20	....
H 22 a. Steam engines		....	7,742 00
H 23. Boilers		....	2,464 00
H 24. Inside wiring		886 62	....
H 25.		....	....
H 26. Auxiliary apparatus		....	1,827 00
H 27. Dynamos (and electric plant.—A.)		12,586 31	14,259 00
H 28.		....	....
H 29. Transformers	P.	3,311 00	4,318 00
(a) Station	$1,440 00		
(b) Line	2,878 00		
H 30. Lines overhead		9.648 79	9.205 00
H 31. Arc lamps		3.231 01	3.720 00
H 32. Incandescent lamps (street.—A.)		38 19	37 00
H 33.		....	....
H 34. Meters		2.230 15	1,680 00
H 35. Other appliances, office furniture		543 00	....
H 36. Teams, tools and other accessories		570 00	570 00
H 37. Total appraised value		$54,488 62	$49,532 00

The values in the above appraisal are taken from the report of assets made by the municipality to the Gas and Electric Light Commissioners, June 30, 1906. Under the rules of the Commissioners, depreciation of municipal plants is computed at 5 per cent. yearly, and the reported values represent the costs minus depreciation charges.—A.

Appraisal of the Municipal Electric Plant, Westfield, Mass., as of date, June 30, 1906.

Land at station	$871.00
Station and chimney	4,760.00
Steam engines	5,945.00
Boilers	808.00
Auxiliary apparatus	3,056.00
Dynamos and switchboards	7,200.00
Station transformers	1,498.00
Line transformers	2,269.00
Overhead lines	4,993.00
Arc lamps and supports	3,126.00
Incandescent lamps and supports	15.00
Meters for consumers	2,009.00
Teams, tools and accessories	750.00
Total	$37,300.00
Engineering and interest, 7 per cent	2,611.00
Total structural value	$39,911.00—A.

CONSUMPTION.

	A.	P.
H 38. Total number of services (customers—A.)	153	148
H 39. Total number of services, metered (customers on metered service.—A.)	120	120
H 40. Percentage of services metered (of customers on metered service.—A.)	....	....
H 41. Total current delivered at switchboard during the year	....	No record

Mr. Adams answers "No record" for H 42 to H 60, inclusive. Mr. Prichard makes the same answer for the same questions, except that for H 42, "Total current bought during the year," and H 49, "Current supplied free," he answers "none."

	A.	P.
H 61. Number of consumers who used commercial arc lights	7	7
H 62. Number of consumers who used incandescent lights	122	122
H 63. Number of consumers who used electric power and total connected H. P.	27 motors 101¼ H. P.	29 consumers 101¼ H. P.
H 64. Total number of different consumers	153	148

H 65. Arc lamps in use—commercial service. 32 enclosed arc lamps operating with 6.6 amperes, price $5.00 per month. —A. 33 enclosed arc lamps of 4 and 6 amperes, with s. n.—P.

H 66. Arc lamps in use—public lighting. During the year the street lamps operate 3,878 hours and 25 minutes. The number of arc street lamps varied from 114 to 117, and the total lamp hours of service with these lamps were 443,425. 117 enclosed arc street lamps operating with 7.5 amperes each; 4 enclosed arc lamps at the electric station, operating with 7½ amperes each; 1 enclosed arc lamp, operating with 6.6 amperes at the electric station; total, 122.—A. 121 enclosed arc lamps a. c., 7.5 amperes, and 3,876¼ hours of service per year at $105.—P.

H 67. Incandescent lamps connected—public and private. All operated with a. c. 2,969 commercial incandescent lamps 31 public incandescent lamps; 26 incandescent lamps at station; 7 incandescent street lamps, operated 3,878 hours, giving 25,133 lamp hours.

Connected Incandescent Lamps.

Public.		*Public at station.*		*Private.*	
No.	*C. P.*	*No.*	*C. P.*	*No.*	*C. P.*
17	16	3	16	2,784	16
4	25	23	10	156	50
9	8	..	..	23	32
1	50	..	..	6	4
31				2,969	

Public and station incandescent lamps represent 2.6 K. W. Commercial incandescent lamps represent 164.9 K. W. Total connected load of incandescent lamps, 167.5 K. W.—A. 3,000 incandescent lamps a. c., 16 C. P., 3½ watts; total watt capacity, 168.—P.

Abington and Rockland.

APPRAISAL OF PLANT.

H 19. As of date end of fiscal year June 30, 1906.

	A.	P.
H 20-21. Land and buildings (real estate.—A.)	$20,769 10	$20,769 10
H 22-23. Steam engines and boilers (steam plant.—A.)	24,399 02	24,399 02
H 24, 25 and 26.	....	....
H 27. Dynamos (and electric plant.—A.)	16,363 73	16,363 73
H 28.	....	....
H 29. Transformers	3,830 64	3,830 64
H 30. Lines (overhead.—A.)	20,515 89	20,515 89
H 31. Arc lamps	1,500 00	1,500 00
H 32-33.	....	....
H 34. Meters	6,535 07	6,535 07
H 35 and 36.	....	....
H 37. Total appraised value	$93,913 45	$93,913 45

The values in the above appraisal are taken from the report of assets made by the company to the Gas and Electric Light Commissioners. Depreciation charges of companies are not regulated by law, and vary much in percentages of cost. This company has charged $157,282.98 to the construction of its plant.—A.

CONSUMPTION.

	A.	P.
H 38. Total number of (consumers.—A.) (services.—P.)	500	500
H 39. Total number of (meters.—A.) (services metered.—P.)	513	500
H 40.	....	....
H 41. Total current delivered at switchboard during year (a. c.)	K. W. H. 357,257	K. W. H 357,257
H 42	....	....
H 43. Total current to be accounted for	357,257	357,257
H 44. Current sold during the year	279,683	....
H 45. Current used at works and offices	....	Unknown
H 46. Current supplied free	....	None
H 47. Current unaccounted for	77,574	77,574
H 48. Total	357,257	77,574
H 49-50.	....	....
H 51. Current sold for private lighting (est.—A.) (metered.—P.)	131,003	131,003
H 52-53. Current sold for public arc and incandescent lights	105,792	105,792
H 54	....	....
H 55. Current sold for commercial power (est.—A.)	42,888	42,288
H 56.	....	....
H 57. Total current sold	279,683	279,683
H 58, 59 and 60.	....	....
H 61. Number of consumers who used commercial arc lights	3	3
H 62. Number of consumers who used incandescent lights	500	500
H 63. Number of consumers who used electric power and total connected H. P.	26 motors of 186¼ total H. P.	14 consumers, 186¼ H. P.
H 64. Total number of different consumers	500	500

H 65. Arc lamps in use—commercial service. 10 enclosed arc lamps a. c. with 4 amperes each, at meter rates. Total commercial arc lamps, 10.—A. 26 enclosed arc lamps, 4 and 6 amperes a. c. with various hours of service per year.—P.

H 66. Arc lamps in use—public lighting. 49 arc lamps, enclosed, operating with a. c. and 6.6 amperes each during 1,679 hours per year, at the yearly rate of $70.00 per lamp. Total enclosed arc lamps, 49.—A. 49 enclosed arc lamps a. c., operating 1,679 hours per year at $70.00 per lamp. Total lamps, 49.—P.

H 67. Incandescent lamps connected—public and private. 409 public incandescent lamps of 25 C. P. each, operated with a. c.; 9,650 commercial incandescent lamps of 16 C. P. each, operated with a. c.; 3 incandescent lamps of 25 C. P. and 75 lamps of 16 C. P. in office and station.—A. 409 incandescent street lamps of 25 C. P. with a. c., and 9,650 incandescent commercial lamps of 16 C. P., a. c.—P.

Attleboro.

APPRAISAL OF PLANT.

H 19. As of date end of fiscal year June 30, 1906.

	A.	P.
H 20-21. Real estate, land and buildings	$28,931 95	....
H 21. Buildings, offices	....	$28,931 35
H 22-23. Engines and boilers (steam plant.—A.)	73,171 90	73,171 90
H 24. Water power plant	2,537 63	2,537 63
H 25 and 26.	....	....
H 27. Dynamos (and electric plant.—A.)	29,332 75	29,332 75
H 28.	....	....
H 29. Transformers	12,545 44	12,545 44
H 30. Lines (overhead.—A.)	33,730 93	33,730 93
H 31. Arc lamps	2,767 44	2,767 44
H 32.	....	....
H 33. Tools	1,662 11	....
H 34. Meters	9,190 00	9,190 00
H 35. Other appliances (office furniture.—A.)	500 00	....
H 36. Teams, tools and other accessories (auto.—A.)	779 85	2,941 96
H 37. Total appraised value	$196,150 00	$195,150 00

The values in the appraisal are taken from the report of the assets made by the company to the Gas and Electric Light Commissioners, June 30, 1906. Depreciation charges of companies are not regulated by law, and vary much in percentages of costs. This company has charged $259,208.11 to the purchase and construction of its plant, and the original plant was purchased for about one-half of its cost to the selling company, that cost having been about $140,000.—A.

CONSUMPTION.

	A.	P.
H 38. Total number of services (consumers.—A.)	430	536
H 39. Total number of services metered (meters.—A.)	536	536
H 40. Percentage of services metered	....	100
H 41. Total current delivered at switchboard Jan. 1 to June 30, 1906, a. c.	K. W. H. 825,344.690	K. W. H.
H 41 a. Total current delivered at switchboard during year; all a. c.		
(a) 6 months (est.)	....	774,087
(b) 6 months, metered	....	825,344
H 42.	....	....
H 43. Total current to be accounted for	825,344.690	1,599,432
H 44. Current sold during the six months	672,572.140	1,296,660
H 45. Current used at works and offices	....	Unknown
H 46. Current supplied free	....	None
H 47. Current unaccounted for	152,772.550	....
H 48. Total	825,344.690	....
H 49-50.	....	....
H 51. Current sold for private lighting, metered (6 months.—P.)	140,002.135	140,002
H 52 and 53. Current sold for public arc and incandescent lights (6 months, metered.—P.)	65,670.000	65,670
H 54.	....	....

	A.	P.
H 55. Current sold for commercial power.....	466,900.005	....
(a) 6 months, metered..................	....	466,900
(b) 6 months (est.).....................	....	624,088
H 56.	....	....
H 57. Total current sold....................	672,572.140	1,296,660
H 58, 59 and 60. Maximum and minimum daily output and average output per hour for each hour of the day..........................	....	Unknown
H 61. Number of consumers who used commercial arc lights	33	37
H 62. Number of consumers who used incandescent lights	421	344
H 63. Number of consumers who used electric power and total connected H. P.............	164 motors of 947 total H. P.	57 consumers with total of 848 H.P.
H 64. Total number of different consumers....	430	430

H 65. Arc lamps in use—commercial service. 47 enclosed arc lamps, operating with a. c., 6 amperes each; and 61 enclosed arc lamps operating with a. c. and 4 amperes each. Arc lamp service at meter rates. Total enclosed lamps, 108.—A. 118 enclosed arc lamps with 4 and 6 amperes, operating with a. c., metered; total lamps, 118.—P.

H 66. Arc lamps in use—public lighting, a. c. 101 enclosed arc lamps, operating with 6.6 amperes each on June 30, 1906. For lamps operating 1,855 hours per year, the rate was $75.00 each; and for lamps that operated only from 1 A. M. until morning the rate was $38.75 per year each. Total enclosed public arc lights, 101.—A. 101 enclosed public arc lamps of 1,200 C. P., 6.6 amperes, operating with a. c., 1,855 hours per year at $75.00 per lamp.—P.

H 67. Incandescent lamps connected—public and private. All operated with a. c. 259 public incandescent lamps of 32 C. P. each and 35 lamps in office and station of 16 C. P. each. 12,000 commercial incandescent lamps of 16 C. P. each.—A. 1,200 incandescent with a. c., 16 C. P., 3½ watts, and total watt capacity of 672.—P.

Beverly.

APPRAISAL OF PLANT.

H 19. As of date end of fiscal year June 30, 1906.

	A.	P.
H 20-21. (Real estate.—A.) land and buildings	$24,578 89	$24,578 89
H 22-23. Steam engines and boilers (steam plant.—A.)	50,784 13	50,784 13
H 24, 25 and 26	....	....
H 27. Dynamos (and electric plant.—A.).....	43,136 82	43,136 82
H 28.	....	....
H 29. Transformers	11,167 81	11,167 81
H 30. Lines (overhead.—A.).................	55,905 80	55,905 80
H 31. Arc lamps............................	5,914 02	5,914 02
H 32-33.	....	....
H 34. Meters	7,174 47	7,174 47
H 35. Other appliances (office furniture.—A.).	1,058 51	1,058 51
H 37. Total appraised value..................	$199,720 45	$199,720 45

The values in this appraisal are taken from the report of assets made by the company to the Gas and Electric Light Commissioners, June 30, 1906. Depreciation charges of companies are not regulated by law, and vary much in percentages of costs. In 1889, this company paid $18,000 for an electric plant, and since that date the charges to construction have brought the total amount up to $230,989.37.—A.

CONSUMPTION.

	A.	P.
H 38. Total number of services (consumers.—A.)	539	558
H 39. Total number of services metered (meters.—A.)	553	553
H 40. Percentage of services metered	....	100
	K. W. H.	K. W. H.
H 41. Total current delivered at switchboard during the year—		
(a) A. c.	606,595	1,040,382
(b) Direct current	433,787	....
Total	1,040,382	1,040,382
H 42.	....	....
H 43. Total current to be accounted for	1,040,382	1,040,382
H 44. Current sold during year	933,401	803,401
H 45. Current used at works and offices	....	Unknown
H 46. Current supplied free	....	None
H 47. Current unaccounted for	106,981	236,981
H 48. Total	1,040,382	236,981
H 49 and 50.	....	....
H 51. Current sold for private lighting, metered	254,939	254,939
H 52. Current sold for public arc lights	433,787	433,787
H 53 and 54.	....	....
H 55. Current sold for commercial power	134,275	4,275
H 56. Current sold to other companies	110,400	110,400
H 57. Total current sold	933,401	803,401
H 58, 59 and 60. Maximum daily and minimum daily output, and average output per hour for each hour of the day	....	....
H 61. Number of consumers who used commercial arc lights	23	23
H 62. Number of consumers who used incandescent lights	521	521

H 63. Number of consumers who used electric power and total connected H. P.: 11 motors, with total H. P. capacity of $61\frac{5}{8}$.—A. 14 consumers, $61\frac{5}{8}$ H. P.—P.

H 64. Total number of different consumers, 539 private and 1 electric company.—A. 539.—P.

H 65. Arc lamps in use—commercial service. 5 commercial enclosed arc lamps, operating with 5 amperes each and with direct current; hours unknown. Current for commercial arc lamps at meter rates. 54 enclosed arc lamps a. c., operating with 4 amperes each, and 57 enclosed arc lamps operating with 6 amperes each; total, 116 lamps.—A. 111 enclosed arc lamps a. c., with 4 and 6 amperes, metered. Total lamps, 111.—P.

H 66. Arc lamps in use—public lighting. All direct current. 297 enclosed arc lamps operated with 5 amperes; public arc lamps operated 3,807 hours per year, at $90.00 per year per lamp. During the year the number of public arc lamps varied from 231 to 297. Total public arc lamps, 297.—A. 297 enclosed public arc lamps, direct current, 5 amperes and 3,807 hours of service per year at $90.00 per lamp. Total lamps, 297.—P.

H 67. Incandescent lamps connected—public and private. 19,149 incandescent lamps of 16 C. P. each, operated with a. c. and total K. W. ———— 19,114 of these lamps are commercial; others at station and office.—A. 19,114 lamps, 16 C. P., 3½ watts, on a. c.—P.

Fitchburg.

APPRAISAL OF PLANT.

H 19. As of date end of fiscal year June 30, 1906.

	A.	P.
H 20-21. Land and buildings (real estate.—A.)	$66,078 68	$66,078 68
H 22 and 23. Steam engines and boilers (steam plant.—A.)	61,297 63	61,297 63
H 24, 25 and 26.	....	....
H 27. Dynamos (and electric plant.—A.)	43,493 17	43,493 17
H 28.	....	....
H 29. Transformers	6,745 24	6,745 24
H 30. Lines (overhead and underground.—A.)	78,232 14	78,232 14
H 31. Arc lamps	2,059 00	2,059 00
H 32 and 33.	....	....
H 34. Meters	28,053 50	28,053 50
H 35 and 36.	....	....
H 37. Total appraised value	$260,759 36	$260,759 36

The values in this appraisal are taken from the report of assets made by the company to the Gas and Electric Light Commissioners, June 30, 1906. Depreciation charges of companies are not regulated by law, and vary much in percentages of costs. This company purchased an electric plant in the fiscal year of 1890, and at the end of that fiscal year the plant cost was reported as $109,606.51. Since the above date the charges to construction have raised the total to $188,517.91 for the electric plant.—A.

CONSUMPTION.

	A.	P.
H 38. Total number of services (number of consumers.—A.)	513	513
H 39. Total number of services metered (number of meters.—A.)	534	507
H 40.	....	....
	K. W. H.	K. W. H.
H 41. Total current delivered at switchboard during year, a. c.	2,835,687	2,835,687
H 42.	....	....
H 43. Total current to be accounted for	2,835,687	2,835,687
H 44. Current sold during the year	2,107,726	....
H 45. Current used at works and offices	....	Not given

	A.	P.
H 46.		
H 47. Current unaccounted for	727,961	727,961
H 48. Total	2,835,687	2,107,726
H 49 and 50.		
H 51. Current sold for private lighting, metered	291,109	291,109
H 52 and 53. Current sold for public arc and incandescent lights	631,200	631,200
H 54 and 55. Current sold for public power and commercial power	1,185,417	
H 55. Current sold for commercial power		1,185,417
H 56.		
H 57. Total current sold	2,107,726	2,107,726
H 58. Maximum daily output and date		Nov. 28, 1905, 915 K. W.
H 59. Minimum daily output and date		July 4,1905, 245 K. W.
H 60.		
H 61. Number of consumers who used commercial arc lights	29	29
H 62. Number of consumers who used incandescent lights	490	490
H 63. Number of consumers who used electric power and total connected H. P.	131 motors of 1,447 total H. P.	21 consumers 1,446 5-6 total H. P.
H 64. Total number of different consumers	513	513 electric 2,954 gas.

H 65. Arc lamps in use—commercial service. 105 enclosed arc lamps rated at 2,000 C. P. each on a. c. at meter rates. Total enclosed arcs, 105.—A. 107 enclosed arc lamps with a. c., metered.—P.

H 66. Arc lamps in use—public lighting. 318 enclosed arc street lamps a. c. with 6.6 amperes each, during 3,935 hours per year; price per year, $100.00 per lamp, plus $3.00 for each mast arm. Total enclosed arcs, 318.—A. 318 enclosed arc lamps operated with 6.6 amperes and a. c., 3,935 hours per year at $100.00 each, less $3.00, except on mast arms.—P.

H 67. Incandescent lamps connected—public and private. 63 incandescent street lamps of 30 C. P. each and 15,765 commercial incandescent lamps of 16 C. P.—A. 15,765 lamps of 16 C. P. and 63 lamps of 32 C. P., all a. c.—P.

Gardner.

APPRAISAL OF PLANT.

H 19. As of date end of fiscal year June 30, 1906.

	A.	P.
H 20 and 21. Land and buildings (real estate.—A.)	$11,950 05	$11,950 05
H 22-23. Steam engines and boilers (steam plant.—A.)	14,423 52	14,423 52
H 24. Power plant (Diesel engine.—A.) (Diesel plant.—P.)	15,237 98	15,237 98

	A.	P.
H 25-26	....	....
H 27 Dynamos (and electric plant.—A.).....	$15,003 84	$15,003 84
H 28	....	....
H 29. Transformers	5,032 16	5,032 16
H 30. Lines (overhead.—A.)................	17,274 21	17,274 21
H 31. Arc lamps..............................	2,175 79	4,328 52
H 32-33.	....	....
H 34. Meters	7,591 55	7,591 65
H 35 Other appliances (office furniture.—A.).	408 98	408 98
H 36.	....	....
H 37. Total appraised value.................	$89,098 08	$91,250 81

The values in the above appraisal are taken from the report of assets made by the company to the Gas and Electric Light Commissioners, June 30, 1906. Depreciation charges of companies are not regulated by law, and vary much in percentages of costs. This company and the one from which it bought the plant have charged $151,768.77 to construction.—A.

CONSUMPTION.

	A.	P.
H 38. Total number of services (consumers.—A.)	545	548
H 39. Total number of services metered (meters.—A.)	488	488
H 40	....	....
	K. W. H.	K. W. H.
H 41. Total current delivered at switchboard during year, a. c. and d. c..................	377,013	377,013
H 42	....	....
H 43. Total current to be accounted for.......	377,013	377,013
H 44. Current sold during year..............	210,503	....
H 45 Current used at works and offices......	....	Unknown
H 46 Current supplied free..................	....	....
H 47 Current unaccounted for...............	166,510	166,510
H 48 Total	377,013	166,510
H 49. Current sold for private arc and incandescent lamps, unmetered (estimated)......	15,870	....
H 50 Current sold for private incandescent lamps, unmetered (estimated)............	....	15,870
H 51. Current sold for private lighting (metered)	110,163	110,163
H 52 and 53. Current sold for public arc and incandescent lights	36,558	36,558
H 54.	....	....
H 55. Current sold for commercial power.....	47,912	47,912
H 56	....	....
H 57. Total current sold.....................	210,503	210,503
H 58. Maximum load..........................	....	Dec. 22, 1905, 128 amperes
H 59. Minimum load..........................	....	July 2, 16 and 23, 1905, 42 amperes
H 60.	....	....
H 61. Number of consumers who used commercial arc lights	....	None

	A.	P.
H 62. Number of consumers who used incandescent lights	507	507
H 63. Number of consumers who used electric power and total connected horse power	47 motors 179 H. P.	38 consumers, 179 H. P.
H 64. Total number of different consumers	545	545

H 65. Arc lamps in use—commercial service. No commercial arc lamps of any type.—A. ——————— —P.

H 66. Arc lamps in use—public lighting. 52 enclosed arc lamps with alternate current and 6.6 amperes each, at $75.00 per lamp per year, with 1,747 hours of service during year. —A. 52 enclosed 1,200 C. P. lamps, with alternate current, and 6.6 amperes, operating 1,747 hours per year, at $75.00 per lamp.—P.

H 67. Incandescent lamps connected—public and private. 15 incandescent lamps of 50 C. P.; 1 of 25 C. P.; 50 C. P. at $25 per year and 25 C. P. at $15 per year for public street lighting. 8,250 lamps of 16 C. P.—A. 15 50 C. P. and 1 25 C. P. street lamps at $25.00 per year, and $15.00 per year, respectively. 8,250 lamps, 16 C. P., at 3½ watts.—P.

Northampton.

APPRAISAL OF PLANT.

H 19. As of date end of fiscal year June 30, 1906.

	A.	P.
H 20-21. Land and buildings (real estate.—A.)	$33,000 00	$33,000 00
H 22-23. Steam engines and boilers (steam plant.—A.)	40,830 34	40,830 34
H 24, 25, 26.	....	....
H 27. Dynamos (and electric plant.—A.)	32,276 11	32,276 11
H 28.	....	....
H 29. Transformers	8,517 98	8,517 98
H 30. Lines (overhead.—A.)	35,393 27	35,393 27
H 31. Arc lamps	5,290 70	5,290 70
H 32, 33.	....	....
H 34. Meters	9,595 78	9,595 78
H 35.	....	....
H 36. Teams, tools and other accessories	575 40	1,083 51
H 37. Total appraised value	$165,479 58	$165,987 69

The values in the above appraisal are taken from the report of assets made by the company to the Gas and Electric Light Commissioners, June 30, 1906. Depreciation charges of companies are not regulated by law, and vary much in percentages of costs. This company has charged $210,495.53 to construction of its plant.—A.

CONSUMPTION.

	A.	P.
H 38. Total number of services	....	612
H 38 a. Total number of consumers	589	589
H 39. Total number of services metered	....	591
(Meters.—A.)	591	....
(Contract.—P.)	....	21

	A.	P.
H 40.	....	....
	Ampere hours.	
H 41. Total current delivered as switchboard during year, a. c.	499,513	No record
H 42. Total current bought during year	....	None
H 43. Total current to be accounted for	....	Unknown
H 44, 45	....	....
H 46. Current supplied free	....	None
H 47, 48, 49, 50, 51.	....	....
	K. W. H.	
H 52-53. Current sold for public arc and incandescent lights	156,800	....

No record of energy generated or sold, except as above.—A.

	A.	P.
H 54, 55, 56, 57, 58, 59, 60.	....	....
H 61. Number of consumers who used commercial arc lights	31	31
H 62. Number of consumers who used incandescent lights	575	575
H 63. Number of consumers who used electric power and total connected horse power	194 motors 300¾ H.P.	11 consumers 300¾ H.P.
H 64. Total number of different consumers	589	589

H 65. Arc lamps in use—commercial service. 74 enclosed arc lamps operating with 6.8 amperes direct current at $100.00 per lamp per year for midnight service; and $84.00 per lamp per year for service until 10 P. M. Also 23 enclosed arcs with 4 amperes, and 48 with 6 amperes; total, 71, with alternating current. Total enclosed arcs, 145.—A. 74 1,200 C. P., 6.8 amperes, with 2,689 hours of service per year, at $100.00 per lamp for 12 o'clock service, and $80.00 for 10 o'clock service. Total arc lamps, 74, all open.—P.

H 66. Arc lamps in use, public lighting. 105 enclosed arc lamps, a. c., operating with 6.6 amperes during 2,009 hours per year at $74.00 each; and 24 operating with 6.6 amperes during 3,885 hours per year at $100.00 each. Total enclosed lamps, 129.—A. 124 enclosed arc lamps, 1,200 C. P., 6.6 amperes, operating 3,885 hours at $100.00 per year, and 105 enclosed arc lamps, 1,200 C. P., 6.6 amperes, operating 2,009 hours per year at $74.00 per year. All these lamps with a. c. Total enclosed lamps, 229.—P.

H 67. Incandescent lamps connected—public and private. 35 public incandescent lamps of 40 C. P. on a. c., operating 2,009 hours per year at $19 each; 17,135 commercial incandescent lamps of 4 to 50 C. P. on a. c.—A. 17,135 16 C. P. incandescent lamps on a. c. Public, 35 incandescent lamps, 40 C. P., operating 2,009 hours at $19.—P.

Salem

APPRAISAL OF PLANT.

H 19. As of date end of fiscal year June 30, 1906.

	A.	P.
H 20-21. Land and buildings (real estate)—A.	$64,575 00	$64,575 00

	A.	P.
H 22-23. Steam engines and boilers (steam plant.—A.)	$90,700 00	$90,700 00
H 24, 25, 26.	....	....
H 27. Dynamos (and electric plant.—A.)	42,000 00	42,000 00
H 28.	....	....
H 29. Tranformers	10,000 00	10,000 00
H 30. Lines	100,000 00	100,000 00
H 31. Arc lamps (lamps.—A.)	14,000 00	14,000 00
H 32, 33.	....	....
H 34. Meters	18,000 00	18,000 00
H 35. Teams	1,500 00	....
H 36. Teams, tools and other accessories	....	1,500 00
H 37. Total appraised value	$340,775 00	$340,775 00

The values in the above appraisal are taken from the report of assets made by the company to the Gas and Electric Light Commissioners, June 30, 1906. Depreciation charges of companies are not regulated by law, and vary much in percentages of costs. This company has charged $630,210.59 to the construction of its plant.—A.

CONSUMPTION.

	A.	P.
H 38. Total number of services	....	2,102
H 39. Total number of services metered (number of meters.—A.)	2,105	2,102
H 40. Percentage of services metered	....	100
	K. W. H.	K. W. H.
H 41. Total current delivered at switchboard during year, a. c. and d. c	2,920,399.2	2,920,399
H 42.	....	....
H 43. Total current to be accounted for	2,920,399.2	2,920,399
H 44. Current sold during year	2,076,031.7	2,076,831
H 45. Current used at works and offices	....	Unknown
H 46. Current supplied free	....	None
H 47. Current unaccounted for	844,367.5	843,568
H 48. Total	2,920,399.2	2,920,399
H 49, 50.	....	....
H 51. Current sold for private lighting, metered	700,111	700,911
H 52-53. Current sold for public arc and incandescent lights	701,916	701,916
H 54.	....	....
H 55. Current sold for commercial power	329,604.7	329,604
H 56. Current sold for street railway power	344,400	344,400
H 57. Total current sold	2,076,031.7	2,076,831
H 58, 59, 60.	....	....
H 61. Number of consumers who used commercial arc lights	38	38
H 62. Number of consumers who used incandescent lights	1,372	1,372
H 63. Number of consumers who used electric power and total connected horse power	175 motors 850 total H. P.	132 consumers 849¾ H.P.
H 64. Total number of different consumers	1,453	1,453

H 65. Arc lamps in use—commercial service. 205 enclosed arcs of 4 amperes, and 156 enclosed arcs of 6 amperes, all on a. c., at meter rates. Total enclosed, 361.—A. 205 enclosed arc lamps on a. c., 4 amperes, various hours of service, and 156 enclosed arc lamps, 6 amperes, various hours of service; all at meter rates. Total enclosed arc lamps, 361.—P.

H 66. Arc lamps in use—public lighting. 333 enclosed arcs using 6 amperes each and on a. c., at $95.00 per lamp per year. Total enclosed public arcs, 333.—A. 333 6 ampere public arc lamps on a. c., operating 3,861 hours, at $95.00 per lamp. Total enclosed arcs (public), 333.—P.

H 67. Incandescent lamps connected—public and private. 418 incandescent street lamps of 30 C. P. each; 4 incandescent street lamps of 50 C. P., operating with a. c. 39,286 private incandescent lamps, operating with a. c., and 199 operating with d. c.—A. 39,489 private 16 C. P.; 418 public 30 C. P.—P.

Uxbridge and Northbridge.

APPRAISAL OF PLANT.

H 19.	As of date, end of fiscal year, June 30, 1906.	
H 20-21.	Real estate, land and buildings.........	$26,740.87
H 22-23.	Steam plant, engines and boilers.......	34,736.26
H 24, 25, 26.	————	
H 27.	Dynamos and electric plant...............	25,025.73
H 28.	————	
H 29.	Transformers	17,159.21
H 30.	Lines overhead	85,143.28
H 31.	Arc lamps	4,432.26
H 32, 33.	————	
H 34.	Meters	6,326.37
H 35.	Other appliances, office furniture..........	110.53
H 36.	Teams, tools and other accessories.........	1,294.47
H 37.	Total appraised value....................	$200,968.94

The values in the above appraisal are taken from the report of assets made by the company to the Gas and Electric Light Commissioners, June 30, 1906. Depreciation charges of companies are not regulated by law, and vary much in percentages of costs. This company has charged $227,023.13 to the construction of its plant.—A.

CONSUMPTION.

H 38. Total number of services. Number of consumers, 301.

H 39. Total number of services metered. Number of meters, 282.

H 40. ————

		K. W. H.
H 41.	Total current delivered at switchboard during year, a. c.	736,651.3

H 42.	——	
H 43.	Total current to be accounted for	736,651.3
H 44.	Current sold during year	591,442.1
H 45, 46.	——	
H 47.	Current unaccounted for	145,209.2
H 48.	Total	736,651.3
H 49, 50.	——	
H 51.	Current sold for private lighting, metered	92,299.4
H 52-53.	Current sold for public arc and incandescent lights	100,130.9
H 54.	Current sold to other companies	203,614.0
H 55.	Current sold for commercial power	11,024.2
H 56.	Current sold for street railway power	184,373.6
H 57.	Total current sold	591,442.1
H 58, 59, 60.	——	

H 61. Number of consumers who used commercial arc lights, 2.

H 62. Number of consumers who used incandescent lights, 298.

H 63. Motors, with total horse power, 10, of 68 5/6 total H. P.

H 64. Total number of different consumers, 301.

H 65. Arc lamps in use, commercial service. 5 enclosed arc lamps, operating with a. c., 4 amperes each, at meter rates. Total enclosed arcs, 5.

H 66. Arc lamps in use, public lighting. 13 enclosed arc lamps, with a. c., operating with 6.6 amperes, at $67.00 per lamp for 1,849 hours of service. Total enclosed public arcs, 13.

H 67. Incandescent lamps connected, public and private. 425 incandescent street lamps of 25 C. P. each, operated with a. c., at $14.50 each 1,849 hours yearly, and $12 each when operated 1,285 hours yearly. 7,811 commercial incandescent lamps of 16 C. P. each, and 1 of 25 C. P.; all operated with a. c.

H 68. Does the company or department own all the underground conduits it uses?

H 69. If it rents any, state total length, rental, amount of rental, and by whom they are owned.

Municipalities.

The only underground conduits mentioned by either investigator in the municipal plants are in Marblehead. Mr. Adams answers simply "Yes" for the ownership, and Mr. Prichard answers for H 68, "3,320 feet (1,056 feet privately owned)"; and that the city rents no conduits, for H 69.

Companies.

	H 68. *A.*	*H* 69. *A.*	*H* 68. *P.*	*H* 69. *P.*
Abington and Rockland	No conduits	....	No	None
Attleboro	No underground	....	Uses none	.....
Beverly	....	....	Yes	None
Fitchburg	No conduits in use, but 174,767 feet owned	....	Yes	No
Gardner	No underground	....	None	None
Northampton	No conduits	....	None	.....
Salem	No underground	....	None	.....
Uxbridge and Northbridge	No conduits	....	.....	.....

H 70. Estimated population January 1, 1906, on lines; that is, supplied by mains (consumers).

H 71. Annual average consumption per capita on basis of Inquiry H 70.

H 72. Population, area supplied, last national census.

H 73. Annual average consumption per capita on basis of Inquiry H 72.

Municipalities.[1]

	H 70.	*H 71.*	*H 72.*	*H 73.*	
Chicopee	20,191	Note 2.	19,167	....	—A.
	Unknown	....	21,000	....	—P.
Danvers	9,063	51.9	8,542	55.1	—A.
	9,[illegible]00, including the insane asylum	....	9,063	....	—P.
Holyoke	49,934	62.9	45,712	68.7	—A.
	Unknown	Unknown	Unknown	Unknown	—P.
Marblehead	7,209	53.2	7,582	50.5	—A.
	7,500	Unknown	Unknown	Unknown	—P.
North Attleboro........	7,878	36.1	7,253	39.2	—A.
	Unknown	....	Unknown	....	—P.
Peabody	13,098	46.9	11,523	53.3	—A.
	Unknown	Unknown	Unknown	....	—P.
Taunton	30,967	57.1	31,036	57.0	—A.
	No estimate	....	....	....	—P.
Westfield	13,611	Note 2.	12,310	....	—A.
	Unknown	Unknown	Unknown	Unknown	—P.

---

[1] In each case Mr. Adams's answers to H 70 are based on the state census of 1905, and to H 71 and H 73, on energy generated, except in the case of H 71 for Chicopee, when no explanation is given. The population given by Mr. Adams in each case is that of the entire city or town.

[2] Chicopee and Westfield have no record of energy generated or sold.—A.

	Companies.[1]			
	¶ 70.[2]	*¶ 71.*	*¶ 72.*	*¶ 73.*
Abington and Rockland	Both towns, 11,308 Unknown	31.4 K. W. H.	9,816	36.3 K. W. H. —A. .... —P.
Attleboro	12,702 Unknown	64.9 K. W. H.[3]	11,335	72.8 K. W. H. —A. .... —P.
Beverly	15,223	61 K. W. H. per inhabitant in 1905 on the basis of the K. W. H. generated, minus the K. W. H. sold to the Manchester Co. Population of Beverly only is used.	13,884 Population of Beverly; only 11 consumers in Wenham and 3 in Hamilton; sales in Manchester.	66.9 K. W. H. computed as under 71—A. .... —P.
Wenham	924			
Hamilton	1,646			
Manchester	2,618			
	20,411			
Fitchburg	Can't answer 23,021	Average annual consumption per capita on the basis of K. W. H. generated, 85.8 K. W. H., with population of 1905.	31,531	89.9 K. W. H. —A. .... —P.
Gardner	 12,012	31.3 K. W. H. based on the number of K.W.H. generated.	10,813 Unknown	34.8 K. W. H. —A. Unknown —P.
Northampton	Unknown 19,957 20,000 (est.) entire city	Unknown Note 4.	18,643 Unknown	.... —A. .... —P.
Salem	37,627	.... 68.4 K. W. H.	35,956	71.6 K. W. H. —A. .... —P.
Uxbridge and Northbridge	Both towns, 11,281	30.9 K. W. H.	Both towns, 10,635	32.7 K. W. H. —A.

---

[1] In each case the population of the entire city or town is given.—A.

[2] State census for 1905.—A.

[3] For the six months ending June 30, 1906; no record for prior half year.—A.

[4] No record of energy generated or sold at Northampton.—A.

H 74. Are consumers' meters removed and tested at regular intervals? How often?

Municipalities.	A.	P.
Chicopee		No.
Danvers	Once a year	No.
Holyoke, Peabody	No.	No.
Marblehead	Have not been in the past, but will be in the future	No.
North Attleboro	Such tests have not been made, but will be in the future	No.
Taunton	Not at regular intervals, but on request of consumer.	No.
Westfield		No.
	Companies.	
Abington and Rockland	No.	Not regularly.
Attleboro	On request by consumer.	Yes (tested), every 6 months on premises (not removed).
Beverly		Tested on premises once a year.
Fitchburg	Once a year	Yearly; yes.
Gardner	Not tested at any regular intervals	No.
Northampton	No.	Tested when records seem to warrant.
Salem	Tested at least once each year	Once a year or oftener.
Uxbridge and Northbridge	Only on request	

H 75. If the consumer believes that the meter is fast, how may he have it tested?

Municipalities.

Chicopee	May apply to state Gas and Electric Commissioners for test	State law.
Danvers	By state officer or by the municipal plant	State law provides state inspection.
Holyoke	The consumer may have his meter tested at the electric plant, or may apply to state Gas and Electric Commissioners.	By the department or state inspector.
Marblehead		State provision.
North Attleboro	May apply to the Gas and Electric Light Commissioners to have the meter tested	State law; also by plant.
Peabody	Tested by plant without charge.	By the department or by the state, according to law.
Taunton	By the city electric department or by the state Gas and Electric Light Commissioners	By the state or municipal lighting department.
Westfield	By application to the state Gas and Electric Light Commissioners.	By the department or state.

Companies.

	A.	P.
Abington and Rockland	On application to the company, or to the Gas and Electric Light Commissioners.	State.
Attleboro	By the company, on request, or by application to the state Gas and Electric Light Commissioners.	By either the company or state.
Beverly	On application to the state Gas and Electric Light Commissioners..	Company or state.
Fitchburg	By the company, on request, or by the Gas and Electric Light Commissioners	By the company or state, at his option.
Gardner	By application to the company, or to the state Commission of Gas and Electricity...	By the company or state.
Northampton	Application to the company or to the Gas and Electric Light Light Commissioners.	By the company or by the state Board of Gas and Electric Light Commissioners.
Salem	On request to company or by application to state Gas and Electric Commissioners.	By the company or by the state.
Uxbridge and Northbridge.	On application to the company or to the state Gas and Electric Light Commissioners.	

H 76. Are there records of proofs of meters as removed? If so, state them.

Municipalities.

Chicopee		Meters tested, no records kept.
Danvers, Marblehead.	No	No.
Holyoke	No	At gas works, yes. At electric works, no.
North Attleboro		No.
Peabody	No.	Yes; record of its state is preserved .
Taunton	None	No.
Westfield	No	None.

Companies.

Abington and Rockland	No	Yes.
Attleboro		None.
Beverly		Tested before going into service again; no record kept.
Fitchburg		No
Gardner	No	No
Northampton		Yes; office records are kept.
Salem		Every meter is tested when removed and result kept on file.
Uxbridge and Northbridge	No	

H 77. What means are being taken to extend the use of electricity?

	A.	P.
	Municipalities.	
Chicopee, Holyoke, Marblehead, North Attleboro, Westfield.	None.	None.
Danvers	Business solicited.	None.
Peabody	None.	"None, as the station is now loaded to full capacity."
Taunton	None.	No special.
	Companies.	
Abington and Rockland	Work of solicitor.	Personal solicitation and mail advertising.
Attleboro	Company advertises in local press.	Personal solicitation, newspaper and pamphlet advertising.
Beverly		Newspaper advertising.
Fitchburg	The company advertises in the local press.	Local advertising, exhibition room in center of city, and solicitors.
Gardner	Some soliciting.	Newspaper advertising and personal effort.
Northampton	Very little.	Canvassing from house to house.
Salem	The company advertises, solicits and installs wiring at about cost. On December 31, 1906, the company was serving 618 residences, which represented an increase of 69 for the year.	Newspapers, solicitors and mail enclosures
Uxbridge and Northbridge	Slight	

H 78. Are consumers instructed in the use of lighting appliances?

Municipalities.

Adams answers "Yes" for Danvers. All other answers, "No."

Companies.

Abington and Rockland, Attleboro, Salem, Uxbridge and Northbridge	Yes.	Yes.
Beverly, Northampton		Yes.
Fitchburg, Gardner	To some extent.	Yes.

H 79. What means are being taken to extend the use of electrical appliances?

Municipalities.

Adams and Prichard both answer "None" in each case excepting Danvers.

Danvers	Business solicited.	Trying to introduce flatirons (21); few fans.

Companies.

	A.	P.
Abington and Rockland	Electric irons and fan motors loaned and rented.	Personal solicitation; 30 days' free trial.
Attleboro	None.	A complete line of electrical appliances are kept on exhibition and are demonstrated.
Beverly		Public demonstration; printed matter and newspaper advertising.
Fitchburg		See H 77.
Gardner	Appliances are put out on trial for 30 days, without charge for rent.	See H 77 (appliances are being introduced on trial).
Northampton	Little done in this line..	Through the medium of the canvasser.
Salem	Loan of appliances. (See H 77.)	Demonstration and solicitation.
Uxbridge and Northbridge	Limited.	

H 80. Are electrical appliances carried in stock for sale or rent?

Municipalities.

Adams and Prichard both answer "No" in each case excepting Danvers, where Pritchard says "Yes, for sale. Flatirons, grids and all cooking appliance samples are carried."

Companies.

Abington and Rockland, Gardner, Salem, Uxbridge and Northbridge	Yes.	Yes.
Attleboro	Yes.	Yes; for sale at cost.
Beverly		Yes.
Fitchburg	Yes.	Yes; for sale for cash or installments.
Northampton	Yes	No.

H 81. What methods are used to secure new users?

Municipalities.

Adams and Prichard both answer "None" in each case excepting Danvers, where Adams makes no answer.

Companies.

Abington and Rockland	As above (H 77, 78, 79, 80.)	Personal solicitation and mail advertising.
Attleboro, Beverly		See H 77.
Fitchburg		As above (H 77 to H 80.)
Gardner	Soliciting	See H 77 and H 79.
Northampton		Personal canvass.
Salem	See H 77 and 79.	As previously stated (H 77 to H 80).
Uxbridge and Northbridge	Only as above (H 77 to H 80)	

QUALITY.

H 82. State fully the method of testing current regulation and character of service.

	A.	P.
	Municipalities.	
Chicopee	....	Automatic regulation at plant.
Danvers	Use of portable instruments.	None.
Holyoke	Hand regulation at the station and a recording volt-meter at the center of distribution.	Complete switchboard regulation and pressure testing at distributing centers.
Marblehead	Hand regulation, with aid of volt and ampere meters at station, and recording volt meter at center of distribution.	Ammeters and volt meters at station, with hand regulation; recording volt meter at center of distribution, using comparisons in determining operation.
North Attleboro	The only regulation is that by hand, at the station.	None.
Peabody	Portable recording volt meter.	Recording volt meter.
Taunton	Automatic regulator at the plant.	None excepting usual operating instruments.
Westfield	Hand regulation at the station.	None.
	Companies.	
Abington and Rockland	Pressure wires run to station from secondary mains, and pressure on these mains usually held within 2 volts of the standard..	Pressure wires are run from center of distribution.
Attleboro	Automatic regulation at the station. Tests with portable volt meter at the wiring of consumers, and volt meter at the office of the company in the business section.	Bristol recording volt meters and automatic voltage regulator.
Beverly	....	Circuit regulation....
Fitchburg	Automatic regulators on the lighting feeders at the station.	All known modern methods are employed.
Gardner	Automatic regulator at the station.	Recording volt meter and Terrell auto voltage regulator.
Northampton	....	Circuit regulation and recording volt meters.
Salem	Hand regulation of the voltage, at the station, and tests by portable volt meter on the premises of consumers.	Recording instruments and circuit regulation.

	A.	P.
Uxbridge and Northbridge	Automatic and hand regulation at the station.	

H 53. Summarize results of such examination.

Municipalities.

Chicopee		
Danvers	Fair voltage regulation..	None.
Holyoke		Pressure kept constant.
Marblehead, North Attleboro and Taunton		
Peabody	Voltage variation usually limited to 3 per cent.	Pressure is kept normal.
Westfield		No result.

Companies.

Abington and Rockland		Pressure is kept constant.
Attleboro		If examination of charts results in disclosing excessive fluctuations, proper remedies are applied to correct the same.
Beverly		If conditions become abnormal, proper remedies are applied to correct the same.
Fitchburg		
Gardner	No record.	Kept at proper pressure.
Northampton		Pressure kept constant.
Salem	On the premises of consumer; the rule is to hold the pressure variations within 2 volts in either direction from the standard.	If any abnormal fluctuations occur, proper remedy is applied.
Uxbridge and Northbridge	No record.	

H 54. Attach form on which tests are recorded. No forms given for municipalities.

Companies.

Abington and Rockland	No forms.	No tests.
Attleboro, Beverly and Northampton		No forms.
Fitchburg		
Gardner	No form	None.
Salem	Chart from recording volt meter sent. (Chart not reproduced.—J. H. G.)	No forms.
Uxbridge and Northbridge		

H 85. Were outages frequent?

Municipalities.

	A.	P.
Chicopee		No.
Danvers	No.	Frequent outages on street lighting. Incandescent commercial, good.
Holyoke	No.	No.
Marblehead	A moderate number.	No. 28 arc lamps in 7 days on street lamps. Commercial service, once on one circuit.
North Attleboro	No.	Very seldom.
Peabody	Under 2 per cent	No. Less than 2 per cent.
Taunton	Very few	No.
Westfield		No.

Mr. Prichard answers "No" for all except Attleboro, "One hour's service lost in five years." Mr. Adams, as follows:

Companies.

Abington and Rockland	Said to amount to about 1 per cent. of total lamp hours
Attleboro, Uxbridge and Northbridge	No record
Beverly, Northampton	
Fitchburg	Not frequent, but no available records
Gardner	No record
Salem	Relatively only a small number

H 86. What system of inspection was used to see if all lamps were burning?

Municipalities.

Chicopee		Patrol every night.
Danvers	Inspector from time lamps are started to 11.30 p. m.	Patrol inspects every night every light, from dark to 10.30.
Holyoke	A man patrols the street lighting circuits all night.	Regular nightly patrol.
Marblehead	Three hours' patrol, nightly, four months in year.	Patrol regular, four months in year. 4½ hours daily. No patrol during 8 months, except in case of storms.
North Attleboro	None.	No regular patrol. Largely reported by citizens.
Peabody	Man on duty inspecting street lamps until 10 p. m. Also police.	Patrol system.
Taunton	Patrol man to inspect street lamps every night.	Patrol nightly.
Westfield		Patrol.

Companies.

	A.	P.
Abington and Rockland	Inspector goes over street lamps two or three times per week.	Patrol system semi-weekly.
Attleboro	Inspector goes over the street lamps twice per week.	Patrol system nightly.
Beverly		Police notify by 'phone and man is sent to start any lamp so reported.
Fitchburg	Inspector goes over the street lamps every night.	Patrolman with automobile.
Gardner	Inspection once or twice per week.	Patrol.
Northampton	Inspector goes over the line.	Nightly patrol.
Salem	One man employed all night and another man part of night on inspection.	Nightly patrol.
Uxbridge and Northbridge	Inspector goes over the circuit every night.	

H 87. State results of such inspection.

Municipalities.

Chicopee		Keep no records.
Danvers	Very few outages.	Start all lights not burning.
Holyoke	No record.	Outages remedied and are only temporary.
Marblehead	28 outages in 7 days.	See H 85.
North Attleboro		Lamps renewed when reported.
Peabody	See H 85.	Outages kept less than 2 per cent.
Taunton		Lamps started when found not burning.
Westfield		Lamps started when found out.

Companies.

Abington and Rockland	As above (H 85 and H 86)	Lights started when found out.
Attleboro		Lamps found not lighted are started or replaced at once.
Beverly		All lamps are kept burning with but few exceptions.
Fitchburg		Any lamps not lighted were started.
Gardner	No record.	Any lights not burning are started.
Northampton		Lamps occasionally started.

	A.	P.
Salem	During the year 1906, outages of arc street lamps amounted to 6,948 lamp hours. Of this outage of arc lamps, about 4,000 hours were due to an order of the Mayor to suspend operation on a certain night. In the same year the outages of incandescent street lamps amounted to 6,457 lamp hours, of which about 3,000 lamp hours resulted from the order of the Mayor	Any lamps not burning are started or changed.
Uxbridge ana Northbridge	No records	

H 88. Is service supplied 24 hours a day?

Municipalities.

Chicopee, Danvers, Holyoke, Taunton and Westfield	Yes.	Yes.
Marblehead	No regular day service.	No day service except very dark days; otherwise from dusk until dawn.
North Attleboro	No.	No.
Peabody	Yes; except Sundays.	Yes.

Companies.

For the companies Mr. Adams and Mr. Prichard both answer "Yes" in each case.

H 89. If for part only, how many hours each day?

Municipalities.

Chicopee, Danvers, Holyoke, Peabody, Taunton and Westfield. ————

Marblehead. Commercial lighting during darker hours of day.—A. See H 88.—P.

North Attleboro. Variable numbers of hours during the day, according to the demand for light.—A. From sundown to sunrise.—P.

Companies.

All private plants. ————

H 90. Does voltage fluctuate? Furnish voltage charts.

Municipalities.

(J. H. G.) No voltage charts reproduced here.

Chicopee, North Attleboro		No charts.
Danvers	Within narrow limits.	Some during day.
Holyoke, Taunton		No. No charts.
Marblehead		See chart.
Peabody		Not unduly.
Westfield		No. None.

Companies.

	A.	P.
Abington and Rockland	No charts.	No. No charts.
Attleboro		Chart furnished.
Beverly		
Fitchburg		No. Chart furnished.
Gardner	Chart sent.	No. Chart attached.
Northampton		No. No charts kept.
Salem	Chart furnished.	No. Chart attached.
Uxbridge and Northbridge	No charts.	

H 91. Are there any engineering tests or experiments being carried on?

Both Mr. Adams and Mr. Prichard answer "No" in each case, except that Mr. Adams gives no answer for Beverly and Northampton.

H 92. Were there frequent complaints about interruption of service?

Municipalities.

Both Mr. Adams and Mr. Prichard answer "No" in each case, except for Chicopee and Peabody, Mr. Adams gives no answer; and for Danvers Mr. Prichard says "Ten days shut-down in November, both machines being burned out on commercial service."

Companies.

Mr. Prichard, "No," for all.

Mr. Adams:

Abington and Rockland. Few.

Attleboro, Fitchburg and *Gardner.* No.

Beverly, Northampton. ————

Salem. Very few.

Uxbridge and Northbridge. But few.

H 93. Has the electric lighting supply ever been cut off from the city? Describe instances.

Municipalities.

Chicopee, Westfield		No.
Danvers	No.	Yes; as above, on commercial service (H 92).
Holyoke	No.	No.
Marblehead	Once during November 27, 1898, when the Portland was lost, 3 or 4 hours.	November 27, 1898, at time of storm when the steamer Portland was lost, from 4 a. m. until daylight.
North Attleboro	Never cut off except during the daylight hours.	Crossing the wires with fire alarm required shutting down of plant. Accident to machinery caused interruption to part of service.
Peabody	Because of leak in water pipes two years ago, 14 hours Because of storm, 8 years ago, 36 hours.	Ice storm caused 36 hours' failure. Failure of water supply caused 13 hours, about two years ago.

	A.	P.
Taunton	Generator burned out and shut off a part of the service, 3 or 4 years ago	No.
	Companies.	
Abington and Rockland	Commercial supply cut off from Rockland during one hour in 1901.	Not since 1895.
Attleboro	Yes; about 1893, when the station burned. Power load shut off one hour early several years ago	No.
Beverly	....	Two sleet storms; ordered by the city.
Fitchburg	Once, some years ago, when the rise of the river filled the wheel pit with water	Once on account of floods.
Gardner	When fly wheel burst, 10 or 12 years ago	No.
Northampton	....	Station has never been shut down.
Salem	Street lamps one night in March, 1906, by order of mayor	Twice, 1898 and 1906; both times ordered by city on account of bad storms, poles and wires of other departments being down.
Uxbridge and Northbridge	....	

EXTENSIONS.

H 94. What factors have determined the extent and location of extensions?

	A.	P.
	Municipalities.	
Chicopee	Demand for service	Whether extensions desired would be profitable.
Danvers	Prospect for business	Extensions are made a few hundred feet (moderate distance; free). Other cases customers pay cost of material; labor free; or when customer guarantees a certain amount per year, extensions are made by town.
Holyoke	Reasonable prospect for business.	Demand.
Marblehead	No application ever refused, as the town is compactly built. Town about 2½ miles long by 1 mile wide	Wherever necessity requires it, no application ever having been refused, but applications for extensions are not sought. Owing to the compact settlement of the town, liberal extensions are not necessary; 2½ miles long by 1 mile wide.

	A.	P.
North Attleboro	Amount of demand for light.	Nominal extensions are made, but expensive extensions are referred to the town for approval.
Peabody	Prospect of revenue.	Extent of demand for service for commercial, and the town's votes for extensions of street lighting service.
Taunton	The demand for service.	Business offered.
Westfield	Demand for service.	Amount of business offered.

Companies.

Abington and Rockland	The amount of demand for service.	Business offered.
Attleboro	Amount of demand for service.	Wherever the business warrants, they are made.
Beverly		Business demand.
Fitchburg	Demand for service.	Extensions made whenever business warrants.
Gardner	Amount of demand for service.	Business demand.
Northampton	Amount of business offered.	Extensions have always been made where business warranted.
Salem	Where there is any reasonable demand for service.	Extensions are made wherever there is a possible opportunity for business.
Uxbridge and Northbridge	Amount of demand for service.	

H 95. Is the built-up area well served, so that all citizens may use the service?

Municipalities.

Chicopee, Taunton and Westfield	Fairly.	Yes.
Danvers	Nearly so.	Yes.
Holyoke	To a fair extent.	Yes.
Marblehead, North Attleboro and Peabody	Yes.	Yes.

Companies.

Mr. Adams answers "Fairly" in each case, except that for Salem he says "Yes" and Beverly he leaves blank. Mr. Prichard answers "Yes" in each case, except that for Gardner he says "Yes, especially so."

H 96. Has the policy in respect to extensions been liberal?

Municipalities.

Chicopee, Westfield		Yes.
Danvers	Yes.	Conservatively so.
Holyoke	Yes.	Very liberal.
Marblehead, North Attleboro	Yes.	Yes.

	A.	P.
Peabody	Fairly.	Yes.
Taunton	Yes.	Yes.

Companies.

Abington and Rockland, Gardner	Fairly.	Yes, very.
Attleboro	Fairly.	Very liberal.
Beverly		Very liberal.
Fitchburg	Fairly so	Yes.
Northampton		Yes.
Salem	Yes.	Very liberal.
Uxbridge and Northbridge		

H 97. Total length of extensions during past year.

Municipalities.

Chicopee	43,345 feet of wire	8,000 feet (of street?).
Danvers	9,365 “ “ “	
Holyoke	104,840 “ “ “	Gas, 14,703 feet. Electricity ———
Marblehead	8,250 “ “ “	None.
North Attleboro	29,083 “ “ “	500 feet.
Peabody	23,540 “ “ “	18,000 “
Taunton	47,000 “ “ “	
Westfield	25,550 “ “ “	

Companies.

Abington and Rockland	33,470 feet of wire	Gas. Com. Rep.
Attleboro	127,258 “ “ “	30,000 feet.
Beverly	111,389 “ “ “	
Fitchburg	16,700 “ “ “	17,000 feet.
Gardner	15,434 “ “ “	17,000 “
Northampton	17,430 “ “ “	18,000 “
Salem	12,175 “ “ “	6,000 “
Uxbridge and Northbridge	56,817 “ “ “	

H 98. Have the citizens of any section petitioned for extensions to their district within the last five years?

Municipalities.

Chicopee, Westfield		No.
Danvers	One case, East Danvers.	Several such petitions.
Holyoke	One such petition, and the lines were extended.	Yes.
Marblehead, North Attleboro, Peabody, Taunton	No.	No.

Companies.

Abington and Rockland, Salem and Uxbridge and North bridge	No.	No.
Attleboro		No; only for street lights.
Beverly		Don't apply.
Fitchburg	No such case	No.
Gardner	No.	No; never.
Northampton		No.

H 99. As between several sections petitioning at one time, how are extensions determined and in what order?

Municipalities.

	A.	P.
Chicopee		No such conditions.
Danvers	No such case.	Determined by the municipal light committee, in accordance with conditions of answer to H 94. Every petition considered on like basis.
Holyoke	No such case.	All granted.
Marblehead, North Attleboro	" " "	None.
Peabody	" " "	Each one considered on its own merits.
Taunton	" " "	No such case.
Westfield		" " "

Companies.

Abington and Rockland	No such case.	Does not apply.
Attleboro		None such.
Beverly		Don't apply.
Fitchburg, Gardner, Salem and Uxbridge and Northbridge	No such case.	No such case.
Northampton		

H 100. Were extensions made promptly when there was a demand?

Municipalities.

Mr. Adams and Mr. Prichard both answer "Yes" in each case, except that Mr. Adams makes no answer as regards Chicopee and Westfield; and Mr. Prichard as regards Westfield says "Yes, if the business warranted."

Companies.

Abington and Rockland Salem	Yes.	Yes.
Attleboro	Yes; if made at all.	Yes.
Beverly, Northampton		Yes.
Fitchburg, Gardner	Yes; if demand was large enough.	Yes.
Uxbridge and Northbridge	If demand was large enough.	

H 101. Was every applicant for service able to get it promptly?

Municipalities.

Mr. Adams and Mr. Prichard both answer "Yes" in each case; except for Chicopee Mr. Adams makes no answer and Mr. Prichard says "Yes if on existing lines," and for Westfield Mr. Adams makes no answer.

Companies.

Abington and Rockland, Attleboro	Yes; if at all.	Yes.
Beverly, Fitchburg, Gardner, Northampton		Yes.
Salem	Yes; as a rule.	Yes.
Uxbridge and Northbridge	Yes; if at all.	

H 102. Has the necessity for passage of an ordinance ever caused delay in extending the service?

	A.	P.
	Municipalities.	
Chicopee, Westfield		No.
Danvers, Holyoke, Peabody	No.	No.
Marblehead	Not necessary to wait for ordinance	No.
North Attleboro	No.	Except as explained in H 94.
Taunton	No ordinance necessary.	No.
	Companies.	
Abington and Rockland, Attleboro, Fitchburg, Northampton and Salem	No.	No.
Beverly		Don't apply.
Gardner	Yes; the hearings cause some delay	No.
Uxbridge and Northbridge	No serious delay	

H 103. Has service been extended in advance of the demand in order to stimulate the growth of the district or has it awaited demand?

	Municipalities.	
Chicopee	Usually awaited demand.	Awaited demand.
Danvers, Peabody	Awaited demand	Awaited demand.
Holyoke	Awaited demand	"Both."
Marblehead	Awaited demand	No.
North Attleboro	Awaited demand	The latter.
Taunton	In advance of the demand in a few cases.	The latter.
Westfield	Largely awaited demand.	The former.
	Companies.	
Abington and Rockland, and Attleboro	Awaited demand.	The latter.
Beverly		The former.
Fitchburg	Awaited demand	Yes; the former.
Gardner	Awaited demand	The former.
Northampton		Extended in advance of demand.
Salem	In advance of demand.	The former.
Uxbridge and Northbridge	Awaited demand	

H 104. Was the department free to use its judgment about extensions or was an ordinance required authorizing the extensions?

	Municipalities.	
Chicopee		Free to use its judgment.
Danvers	Department free	Free to use its judgment.
Holyoke	Department free to use its judgment	The former.
Marblehead	Free to use judgment	Free to use judgment.

	A.	P.
North Attleboro	Free to use judgment...	Except as explained in H 94.
Peabody	Free to use judgment...	Department was free.
Taunton	Manager used his judgment.	The former.
Westfield	Department free to use its judgment.	The former.
	Companies.	
Abington and Rockland	Free to use judgment...	....
Attleboro	Manager decides whether to make extensions and then franchise is secured.	The former.
Beverly	....	Don't apply.
Fitchburg	Manager uses his judgment. Ordinance granted extensions when desired.	Yes.
Gardner	If the manager decides on an extension, a permit must be secured for lines.	....
Northampton	Ordinance necessary, but could be had on request.	Free to use own judgment.
Salem	Manager usually free to use his own judgment, but permit must be obtained from city....	Yes.
Uxbridge and Northbridge	Manager decides on extensions and then permit is obtained.	

H 105. May service be extended to suburban sections not within the city limits? State fully the conditions upon which this may be done.

Municipalities.

Chicopee. If the plant bought by the city extends into other cities or towns, the service there may be continued, but the city has no authority to run new lines into other cities and towns.—A. No.—P.

Danvers. If the city or town has bought a plant with distributing apparatus in the suburbs, the city may continue the supply in these suburbs.—A. Yes: when consumer pays cost of extensions.—P.

Holyoke. If the existing plant bought by the city had distributing apparatus in another city, then the service may be continued. This is true for all municipal electric plants.—A. Yes.—P.

Marblehead. The town has no authority to erect poles, wires or conduits in other cities or towns.—A. No.—P.

North Attleboro. Cannot extend to other cities, but in cases where the city has bought an existing plant that has distributing apparatus in other cities, the service may be continued. This is generally true of municipal electric plants in Massachusetts.—A. See H 94.—P.

Peabody. By special act, chapter 97 of the laws of 1901, Peabody was authorized to distribute electric energy in the Town of Lynnfield, on condition that Peabody first obtain the consent of the selectmen of Lynnfield, which was done.—A. Yes. The Town of Lynnfield was served from the Peabody plant after legislative authority was secured.—P.

Taunton. No authority to extend beyond city limits.—A. Yes; if not a separate municipality.—P.

Westfield. Town has no authority to erect poles, wires or conduits in other towns.—A. Yes; if it is not a separate municipality, and the amount of business warrants.—P.

Companies.

Abington and Rockland, Gardner. If the corporate charter permits and the franchise is obtained, the service may be extended to other cities or towns.—A. Yes.—P.

Attleboro. It is said that this company has authority to distribute electric energy in Town of North Attleboro. If the company can secure a franchise in another city or town, and if the charter of the company permits, then service may be extended to such city or town.—A. These conditions do not apply to this company.—P.

Beverly. If the charter of the corporation permits and a franchise is granted by another city or town, the service may be extended to such city or town. By special act, the Beverly company may supply electric energy in the towns of Manchester, Hamilton and Wenham, subject to the general laws.—A. Yes.—P.

Fitchburg. Service is not so extended, but such extension may be made if corporate charter allows and franchise is granted by the cities or towns.—A. Yes.—P.

Northampton. If the corporate charter permits, the service may be extended wherever a franchise is obtained.—A. No.—P.

Salem. The Salem company has the right to operate in a part of Peabody. If the charter of the corporation permits and a franchise can be obtained, the corporation may extend its service into other cities or towns.—A. Yes.—P.

Uxbridge and Northbridge. If the corporate charter permits, the service may be extended to any place where a franchise can be got.—A.

STREET WORK.

H 106. Was street work done by direct employment or contract?

Municipalities.

Mr. Adams and Mr. Prichard answer in each case "Direct employment," except as follows: *Chicopee* and *Westfield,* Mr. Adams makes no answer. *Marblehead,* "By street department at expense of light department."—A. "Direct employment at the expense of the light department."—P.

Companies.

Both Mr. Adams and Mr. Prichard answer "Direct employment" in each case, except as follows:

Beverly. ———— —A.

Fitchburg. Contract.—P.

Uxbridge and *Northbridge.* Both.—A.

H 107. Was the work done by contract properly inspected?

Municipalities.

No contract work done.

Companies.

The only contract work done for the companies was in Fitchburg and Uxbridge and Northbridge. Mr. Adams answers for neither of these plants, and Mr. Prichard answers "Yes" for Fitchburg.

H 108. Was the work performed in an efficient manner?

Municipalities.

	A.	*P.*
Chicopee		None
Danvers, Peabody		Yes
Holyoke, North Attleboro		
Marblehead		None so done
Taunton		No contract work
Westfield		Yes

Companies.

Mr. Prichard answers "Yes" in every case. Mr. Adams makes no answers.

H 109. Was the street surface properly restored after openings were made?

Municipalities.

Chicopee, Danvers, Westfield, Peabody		No openings
Holyoke		
Marblehead		Yes
North Attleboro		No openings except for poles
Taunton		Yes, openings for poles only

Companies.

Abington and Rockland and Attleboro, Salem		No openings
Beverly		Don't apply
Fitchburg		Yes
Gardner		
Northampton		No underground
Uxbridge and Northbridge		

H 110. Was water used in puddling ditches?

Municipalities.

Chicopee, Westfield		No ditches
Danvers, Peabody	Yes	No ditches
Holyoke		
Marblehead	Yes	Yes
North Attleboro	No ditches	No ditches
Taunton	No underground	No ditches

Companies.

Abington and Rockland, Attleboro	No ditches	No ditches
Beverly		Don't apply

	A.	P.
Fitchburg		Yes
Gardner	No ditches	
Northampton	No ditches	No underground
Salem	No ditches	No openings
Uxbridge and Northbridge	No ditches	

H 111. Were open trenches and obstructions properly guarded?

Municipalities.

Chicopee		No ditches
Danvers	Yes	No open trenches
Holyoke, North Attleboro		
Marblehead	Yes	Yes
Peabody	Yes	None
Taunton	No underground	None
Westfield		Were none

Companies.

Abington and Rockland		No ditches
Attleboro	No trenches	Yes
Beverly		Don't apply
Fitchburg		Yes
Gardner		
Northampton		No underground
Salem	No ditches	No openings
Uxbridge and Northbridge		

H 112. How are sunken trenches taken care of?

Municipalities.

Both Mr. Adams and Mr. Prichard indicate that there are no trenches, or fail to answer this question in every case except Marblehead, which is answered as follows:

Marblehead. Filled to grade by street department or by light department at its own expense.—A.

Sometimes by light department and sometimes by the street department. When by the latter, no charge is made to the light department.—P.

Companies.

Answers for the companies indicate that this question does not apply except to Fitchburg, for which the answers are as follows:

Made good by company.—A.

By proper remedy by the contractor.—P.

H 113. What has been the policy in regard to improving the condition of street service prior to street paving or repaving?

Municipalities.

The answers indicate that, there being no underground work, this question does not apply.

Companies.

There being no underground service except in Fitchburg, the question does not otherwise apply.

Fitchburg. Service overhead.—A.

Put in previous to same.—P.

H 114. Is there any up-to-date map showing the location and nature of all street mains and fixtures?

Municipalities.

	A.	P.
Chicopee, Westfield...	....	No
Danvers, Marblehead.	No	No
Holyoke	Yes	Yes
North Attleboro......	Yes	No
Peabody	Maps of mains.........	No
Taunton	For street lamps only..	No

Companies.

Abington and Rockland, Fitchburg....	Yes	Yes
Attleboro	For street lamps only..	Yes
Beverly	....	No, none owned by the city defining streets
Gardner	Map not complete......	No
Northampton, Salem..	Yes	No
Uxbridge and Northbridge	Yes	

H 115. Who decides where underground structures shall be located in the street?

Municipalities.

The answers indicate that the question does not apply, except as follows:

Holyoke	....	Board of public works
Marblehead	Light department......	Municipal light department
Taunton	....	None yet; city engineer when any are located

Companies.

Abington and Rockland and Gardner..	No underground........	Selectmen
Attleboro	No underground........	Board of Selectmen
Beverly	....	....
Fitchburg	Street commissioners...	City engineer
Northampton, Salem..	No underground........	City engineer
Uxbridge and Northbridge	No underground.......	

H 116. Is a permit from a public authority required before the street may be opened?

Municipalities.

Chicopee	....	No
Danvers	No	No openings
Holyoke	No	Yes
Marblehead	Yes for trenches, no for poles	Yes for trenches, no for poles
North Attleboro	No	None
Peabody, Westfield...	No	No
Taunton	No	....

Companies.

Abington and Rockland	Yes	....
Attleboro, Fitchburg, Salem	Yes	Yes
Beverly, Gardner...	Yes	No

	A.	*P.*
Northampton	Yes	(See H 116 and 117). No permits required Don't know
Uxbridge and Northbridge	Yes	

H 117. Is a separate permit obtained for each opening?

	Municipalities.	
Chicopee		No
Danvers	No	No openings
Holyoke	No	Yes
Marblehead	Yes, for trenches	Yes
North Attleboro	No	No
Peabody	No	None
Taunton, Westfield	No	
	Companies.	
Abington and Rockland	One permit may cover any number of openings in one job	
Attleboro, Salem	One permit may cover any number of openings in one job	Yes
Beverly, Gardner, Fitchburg	One permit may cover any number of openings in one job	No
Northampton	One permit may cover any number of openings in one job	See H 116
Uxbridge and Northbridge	One permit may provide for any number of openings in one job	

PURCHASE OF SUPPLIES.

H 118. Who places the orders for materials and who governs the placing of orders?

	Municipalities.	
Chicopee, Holyoke and Peabody	The manager	The manager
Danvers	The manager and the Board	The manager
Marblehead	Chairman of the Board.	Chairman of M. L. B. as purchasing agent
North Attleboro	Municipal light board	The manager
Taunton	The manager	The manager direct
Westfield	The manager and municipal light board, composed of the selectmen	The manager
	Companies.	
Abington and Rockland	The manager and the superintendent	The manager
Attleboro	Usually the manager	The manager
Beverly		The manager
All others	The manager	The manager

H 119. Were contracts advertised?

Municipalities.

	A.	P.
Chicopee, Westfield...	....	No
Danvers	Only for coal..........	Yes
Holyoke	When amount is over $500	Yes
Marblehead	Yes, on large matters...	Yes, on large matters
North Attleboro......	No	No
Peabody	Yes, for coal..........	Yes, for coal
Taunton	No, not ordinarily......	Yes, for constructing plant

Companies.

Both answer "No" in each case, except as follows:

Beverly. ———— —A.

Fitchburg. ———— —P.

Salem. Don't apply.—P.

H 120. What system was used to check the quality of materials and weights or measurements of shipments?

Municipalities.

Chicopee	....	Checked and inspected
Danvers	Inspection and weight..	Manager's inspection
Holyoke	Inspection	Quality and quantity checked
Marblehead	Inspected by manager and record kept......	Inspected by manager and record kept
North Attleboro......	Inspection by manager..	Inspection by manager
Peabody	Inspection when received	Purchases were properly checked
Taunton	Inspection	Manager's personal inspection
Westfield	....	Proper tally made of each invoice

Companies.

Abington and Rockland	Inspection and weight..	....
Attleboro	Inspection and weight..	Usual methods
Beverly	....	All shipments checked for quality and weight, and fuel weighed as used
Fitchburg	Inspection and weight..	Usual precaution
Gardner	Inspection and weight..	No system, but shipments are checked
Northampton	Inspection and weight..	Quality and quantity checked
Salem	Inspection and weight..	Yes
Uxbridge and Northbridge	Inspection	

H 121. What redress is there in case of shortages or poor quality of shipments?

Municipalities.

	A.	P.
Chicopee	....	Claim made and adjustment secured
Danvers	....	Shortages adjusted; poor quality returned for exchange
Holyoke	Adjustment had.......	Claim made and adjustment secured

	A.	P.
Marblehead	Adjustment secured	Proper adjustment secured
North Attleboro		Claim made and settled
Peabody, Westfield		Claim made and adjustment secured
Taunton	Rejection or adjustment	Claim made and adjustment secured

Companies.

Abington and Rockland		
Attleboro, Beverly, Gardner, Northampton and Salem		Claim made and adjustment secured
Fitchburg		Adjusted
Uxbridge and Northbridge		

H 122. How did prices and quality compare with those paid by private companies?

Municipalities.

Chicopee, Westfield		Buy at lowest prices
Danvers, Holyoke and Taunton	Favorably	Purchases made at lowest possible prices
Marblehead		Impossible to answer
North Attleboro		Buy as favorably as possible
Peabody	Favorably	Lowest market prices secured

Companies.

(J. H. G.) H 122 does not apply to companies.

H 123. Were the dealers supplying materials connected with city, county or state government?

Municipalities.

Both answer "No" in each case, except that Mr. Adams leaves Chicopee and Westfield blank, and for Holyoke says: "Only as to small matters." For Holyoke Mr. Prichard says "Occasionally, not generally."

Companies.

Answers left blank, except for Abington and Rockland, Salem and Uxbridge and Northbridge Mr. Adams says "No"; and for Beverly Mr. Prichard says "Don't apply."

H 124. Were local dealers favored over those outside of the city?

Municipalities.

Chicopee		No local dealers
Danvers	Not on large purchases.	No
Holyoke	Yes, at same prices	Yes, everything being equal
Marblehead	If equally low	If prices were equally low
North Attleboro	Yes, at same prices	No
Peabody	Yes, at same prices	Yes
Taunton	At same prices	Yes, as far as possible
Westfield		Yes

Companies.

	A.	P.
Abington and Rockland	Yes	
Attleboro	Very little from local dealers	Yes
Beverly, Northampton and Salem		Yes
Fitchburg	Yes	Yes
Gardner	Only small purchases from local dealers	Yes
Uxbridge and Northbridge		

H 125. Was there delay in placing orders after the engineer or superintendent expressed the necessity for supplies?

Municipalities.

Both answer "No" in each case, except that Chicopee and Westfield Mr. Adams leaves blank, and for North Attleboro he says "In some cases."

Companies.

Abington and Rockland	Not usually	
Attleboro	No, not as a rule	None
Beverly, Gardner		No
Fitchburg	No	No
Northampton		
Salem	Usually, no	No
Uxbridge and Northbridge	No	

H 126. In practice, did the manager get the types and makes of things he asked for, or was he forced to take something else?

Municipalities.

Chicopee, Westfield		Yes
Danvers	Yes	Received what was asked for
Holyoke, Marblehead	Got what he wanted	Got what he wanted
North Attleboro	Not in every case	The former
Peabody	Yes	What was ordered
Taunton	Manager got what he wanted	The former

Companies.

Abington and Rockland	Got what he wanted	
Attleboro	Manager usually got what he wanted	No
Beverly		The former
Fitchburg	Manager gets what he wants	Yes
Gardner	Manager usually gets what is wanted	Yes
Northampton		
Salem	Manager got what he wanted	Yes
Uxbridge and Northbridge	Yes	

H 127. Were bills for materials purchased paid promptly?

Municipalities.

Mr. Prichard, "Yes," to all; Mr. Adams, "Yes," to all except:

Chicopee, Westfield. ——————

Holyoke, Taunton. Yes, every month.

Marblehead, North Attleboro. Thirty days.

Companies.

Mr. Adams makes no reply; and Mr. Prichard answers "Yes" for all, except Abington and Rockland, which he leaves blank.

GENERAL MATTERS.

H 128. Is the plant adequately equipped to handle the business?

Municipalities.

	A.	*P.*
Chicopee	Greater capacity desirable	Yes
Danvers	Greater capacity in electric generators should be provided	Yes, in the summertime (manager's statement)
Holyoke	Yes	Yes
Marblehead	Lacks reserve capacity	Yes, but no duplication
North Attleboro	Was not on June 30, 1906, but contracts for more equipment had then been made	No, but is being rebuilt
Peabody	Should have greater capacity	No
Taunton	Yes, except that more generator capacity is necessary	Yes
Westfield	Should have greater capacity	Yes

Companies.

Mr. Prichard, "Yes," to all; Mr. Adams, as follows:

Abington and Rockland, and *Gardner.* More capacity desirable.

Attleboro. Two 500 K. W. turbine alternators are being added.

Beverly. Increase of capacity was desirable on June 30, 1906, but has since been made.

Fitchburg, Salem. Yes.

Northampton, Uxbridge and Northbridge. ——————

H 129. Is the equipment of modern and efficient type?

Municipalities.

Chicopee	Only in part	The original equipment
Danvers	Steam engines are not of efficient type, and the use of jack shaft should be discontinued.	Only in part
Holyoke	Yes, except as to the old steam engines and water power equipment purchased from Holyoke Water Power Co.	Yes
Marblehead	Only in part	No
North Attleboro	Efficient only in part	No
Peabody	Only in part; should have more efficient engines	No

	A.	P.
Taunton	Yes	Yes
Westfield	In part.	Yes

Companies.

Abington and Rockland and Beverly	Only in part	Yes
Attleboro	The greater part of the equipment is of efficient type	Yes
Gardner	In part, but not entirely	Yes
Fitchburg	Yes	Yes
Northampton		Efficient, but not entirely modern
Salem	Yes, nearly all of it	Yes
Uxbridge and Northbridge	In part	

H 130. Is it in good condition?

Municipalities.

"Fair" for Mr. Adams for all except *Holyoke* and *Taunton*, "Yes." "Yes" for Mr. Prichard for all except *Peabody*, "Fair."

Companies.

Mr. Prichard, "Yes" for all; Mr. Adams as follows:

Abington and Rockland, Beverly. Fair.

Attleboro, Salem. Most of it.

Fitchburg. Yes.

Gardner. Not the best.

Northampton, Uxbridge and Northbridge. ———.

H 131. Will it be necessary to make extensive repairs or alterations in the near future?

Municipalities.

Chicopee	Desirable	No
Danvers	Electric generating equipment must be increased	Just been made at an expenditure of $28,836
Holyoke	Not until the increase of load requires further extensions of generating plant	No
Marblehead	Advisable	Not necessary, but advisable
North Attleboro	Contracts that are being executed provide ample capacity	Yes, now being made
Peabody	Yes	Yes, if generating plant is to be continued, $50,000 will be required. See report Electric Auditing Company (employed by the town) (report not reproduced here.—J. H G.)
Taunton	Not repairs, but increase of capacity	Extensions, yes; repairs, etc., no
Westfield	Desirable	No

Companies.

	A.	*P.*
Abington and Rockland	Extensions desirable	No
Attleboro	Water power plant to be abandoned and steam turbines added	Large extensions contracted
Beverly	Probably not, in view of the increased capacity since June 30, 1906	No
Fitchburg	A 1,000 K. W. alternator has been added since June 30, 1906	No
Gardner	Yes; additions, repairs and alterations	Additions, but not repairs or alterations
Northampton	....	Expect to install two or three-phase system
Salem	Probably not	No; increase only excepted
Uxbridge and Northbridge	....	

H 132. Is the plant kept in clean and neat condition?

Municipalities.

Chicopee, Marblehead, North Attleboro, Peabody	Fair	Yes
Danvers	Fair	Fair
Holyoke	Yes	Yes, very
Taunton, Westfield	Yes	Yes

Companies.

Mr. Prichard, "Yes" for all. Mr. Adams, "Fair" for all except:

Fitchburg. Yes.

Gardner. No.

Northampton, Uxbridge and *Northbridge.* ——————

H 133. Are the works adequately ventilated?

"Yes" for all, public and private.—P. "Fair" for Mr. Adams for all except:

Municipalities.

Holyoke, Marblehead, Taunton. Yes.

Companies.

Fitchburg. Yes.

Gardner. No.

Northampton, Uxbridge and *Northbridge.* ——————

H 134. Are the pits, shafts and machinery properly guarded?

"Yes" for all except *Danvers,* "Partially."—P.

Municipalities.

Mr. Adams, "Yes" for all except:

Danvers, North Attleboro, Peabody. Fairly.

Companies.

Mr. Adams, "Fairly" for all, except:

Abington and *Rockland, Northampton, Uxbridge* and *Northbridge.* ——————

Fitchburg. Yes.

Gardner. No.

H 135. Are the offices for payments, complaints and other business conveniently located?

Municipalities.

Both answer "Yes" in every case, except for *North Attleboro.*

	A.	P.
North Attleboro	Location at plant not entirely convenient	**No**

Companies.

Abington and Rockland	Yes	Local collection offices in center of each town. Office at works
Attleboro	Yes	Yes, in center of town
Beverly, Northampton		Yes
Fitchburg, Gardner, Salem	Yes	Yes
Uxbridge and Northbridge		

H 136. Were the consumers' complaints promptly and efficiently attended to?

Both answer "Yes" in each case, except that Mr. Adams does not answer for *Chicopee.*

H 137. Describe office system of handling complaints.

Municipalities.

Chicopee		Received by 'phone and man sent to investigate and remedy
Danvers	No system	All complaints are made to the M. L. Committee and by them referred to the manager for attention
Holyoke	Complaints received at the office in City Hall and then telephoned to the station	Card catalogues kept of all complaints and all detail kept connected therewith
Marblehead	Received by clerk of Board and telephoned to the station and man sent	Received by clerk of Board and referred to manager for attention
North Attleboro	No system	Man is sent to investigate and remedy cause
Peabody	None	Received by mail, 'phone or manager, and person delegated by manager to investigate and remedy
Taunton	Received at the office and a man sent from there or from the station	Received by 'phone and turned over to proper man for attention
Westfield		When same are received man is ordered to investigate and remedy

Companies.

	A.	P.
Abington and Rockland	A man is sent as soon as possible after the complaint is received.	Proper man delegated to investigate and remedy any complaint
Attleboro	....	As soon as received proper man is directed to investigate and remedy same. This facility is continued throughout each 24 hours
Beverly	....	Man on duty all hours to attend to same
Fitchburg	....	Attended to at once by man employed for that purpose
Gardner	....	Man despatched to investigate and correct. Man on duty all times during day and night
Northampton	....	Applications are promptly attended to and man is sent out immediately
Salem	Office receives complaints by telephone or otherwise and sends a man promptly	Man immediately despatched to investigate and remedy
Uxbridge and Northbridge	Man sent as soon as convenient after superintendent receives notice	

H 137a. How are leak complaints attended to at night?

Municipalities.

Chicopee	....	Promptly
Danvers	Lineman on call........	Man is detailed to look up and remedy same at once after report is received
Holyoke	Man on call for the purpose	Man on duty to investigate and remedy same
Marblehead	Man sent.............	A man is despatched at once to premises reported
North Attleboro......	By lineman or superintendent	Attended to next day
Peabody	Man on call...........	Man despatched to source of trouble to remedy this condition
Taunton	Lineman sent..........	Man is despatched at once to answer such complaint
Westfield	....	Man sent to source of difficulty at once

Companies.

	A.	P.
Abington and Rockland	A lineman is subject to call for this work....	Man despatched to source of trouble at once
Attleboro	Man on duty for such work	See H 137
Beverly	....	Man on call
Fitchburg	Man provided for such cases	Man sent out at once
Gardner	Man on call for such work	At once remedied
Northampton	....	Night inspector on duty
Salem	Lineman on duty at night attends.........	Inspector on duty all night to attend to same
Uxbridge and Northbridge	A lineman on call for this work............	

H 138. Is there a system of badging or uniforming the employees so that they may be known to the public?

Municipalities.

Chicopee, Westfield...	....	No
Danvers, Marblehead, North Attleboro, Fitchburg	No	No
Holyoke	No	Badging
Peabody	Badge for those entering buildings.........	Badges

Companies.

"No" for all, except:

Beverly	....	None
Fitchburg	Only for meter men....	Of badging
Salem	Badges only............	Badges

H 139. Are the general morale and discipline of employees good, bad or indifferent?

Municipalities.

"Good," for all except:

Chicopee	.. ..	No
Danvers, Holyoke, Westfield, Marblehead	....	
North Attleboro.....	Appears to be good.....	

Companies.

Mr. Adams answers for no plants. Mr. Prichard, "Good," except as follows:

Beverly. "Yes."

H 140. Are the employees who meet the public polite and attentive?

Municipalities.

Mr. Adams answers with a dash for all municipalities except *Holyoke* to which he answers "Yes." Mr. Prichard answers "Yes" in all cases.

Companies.

Mr. Adams answers "Yes" in the case of Fitchburg, and answers in all other cases with a dash. Mr. Prichard answers "Yes" in each case.

H 141. Are they neatly dressed?

Mr. Adams answers with a dash in all cases, both municipal and private.

Mr. Prichard answers "Yes" in all cases, except that for *Danvers* he answers "Workingmen," and for *Holyoke* he answers with a dash.

H 142. Do the various departments work in harmony? Is there friction or jealousy, and does one department shirk work, leaving it to be done by another?

Municipalities.

	A.	*P.*
Chicopee	....	In harmony. No
Danvers	....	No. All harmony
Holyoke	All departments work in harmony under the direct control of the manager	Harmony. No friction or jealousy
Marblehead	Work in harmony	No
North Attleboro	All must work in a way satisfactory to the manager	No
Peabody	All work in harmony under the manager	Harmonious
Taunton	All work as directed by the manager	Harmonious
Westfield	....	The former
	Companies.	
Abington and Rockland	All work as directed by the superintendent	....
Attleboro	Work is done as directed by the manager	Does not apply to the company
Beverly, Gardner	....	....
Fitchburg	The manager runs the business and the men follow his instructions	....
Northampton	....	In harmony
Salem	All departments work under the control of the manager	Don't apply
Uxbridge and Northbridge	All the men work under the direction of the superintendent	

H 143. Is there an adequate system of telephones?

Both investigators answer, "Yes," in each case, except that Mr. Adams dashes for *Chicopee*, and Mr. Prichard answers, "Public service," for *Danvers;* and that Mr. Adams does not answer for *Beverly* and *Northampton*.

H 144. Are the works and offices properly watched at night?

Both investigators answer, "Yes," for each municipality; and also for each company, except that Mr. Adams answers with a dash in the case of *Attleboro, Beverly, Gardner* and *Northampton*.

H 145. Are employes generally permitted to run to fires, or is some one appointed to go?

Municipalities.

	A.	*P.*
Chicopee, Westfield ...	....	Some one is appointed
Danvers	Line man appointed....	Employees generally
Holyoke	Some one is appointed..	Employees allowed to go
Marblehead	....	Employees generally permitted
North Attleboro......	Electrical superintendent goes............	One man goes to fires
Peabody	One appointed.........	One appointed
Taunton	Manager and line man go	Some one appointed

Companies.

Abington and Rockland	Superintendent or line foreman goes.........	Some one appointed to go
Attleboro	One of the line men goes	The former
Beverly	....	Some one appointed
Fitchburg	A man appointed to go .	A man appointed to go
Gardner	Man on call goes.......	Some one appointed to go
Northampton	....	No
Salem	It is the duty of certain persons to go.........	Man appointed to go
Uxbridge and Northbridge	....	

H 146. Is there any system of inspection to prevent workmen of other companies or city departments from injuring the underground structures?

Municipalities.

The answers indicate that there are no underground structures for municipal plants except *Marblehead.*

Marblehead. General observation of commissioners and manager.—A. Proper inspection maintained during opening done by other companies.—P.

Companies.

The answers indicate that there are no underground structures except in *Fitchburg.*

Fitchburg. No.—A. Yes; inspection on the job.—P.

H 147. Has the manager maintained an adequate system of reports made to him of the details of the operation of the plant, day by day, so as to show manufacturing results, cost per unit, length of underground or overhead structures installed, *etc.*?

Municipalities.

Chicopee, Westfield...	No	No
Danvers	Yes, as to manufacturing results.	No, as to manufacturing costs
Holyoke, Peabody...	Yes	Yes
North Attleboro, Taunton, Marblehead...	Yes	No

Companies.

	A.	P.
Abington and Rockland, Fitchburg	Yes	Yes
Attleboro	Yes, as to the six months ending June 30, 1906.	Yes.
Beverly		No. Are now establishing proper system
Gardner	Yes	Yes
Northampton	No	No
Salem	Yes	Yes, form attached. (Form not reproduced here.—Gray.)
Uxbridge and Northbridge	Yes	

H 148. Attach the form on which the manufacturing records are kept.

The answers to this question indicate that such records are not kept, except that Mr. Prichard says they are kept in book form for *Holyoke,* and Mr. Adams for *North Attleboro,* except in the following instances, for which forms were sent:

P.—For *Danvers* and for *Attleboro.*

A.—For *Taunton,* and for all private companies except *Beverly* and *Northampton.*

H 149. Was there a drafting room maintained?

Municipalities.

Chicopee, Danvers, Marblehead, North Attleboro and Westfield	No	No
Holyoke	Yes	City engineer's office furnished plans
Peabody		No
Taunton	Yes	No

Companies.

Mr. Adams answers, "No," for all plants except *Beverly* and *Northampton,* which he dashes. Mr. Prichard answers, "No," for all plants except:

Attleboro	Done outside.
Fitchburg	No; done by outside engineers.

H 150. What system was in vogue to take care of the tools distributed to employees?

Municipalities.

Chicopee		Each one cares for his own
Danvers	No system	No tools supplied
Holyoke	No system	Employees held personally responsible
Marblehead	No system	None
North Attleboro	None	No system
Peabody, Taunton	No system	No system
Westfield		None

Companies.

Mr. Adams answers in each case with a dash, except that he answers, "No system," for *Gardner,* and "None," for *Salem* and for *Uxbridge* and *Northbridge.* Mr. Prichard indicates that there is no system in each case, except that he dashes *Fitchburg*, and answers, "Employees held responsible," for *Northampton*.

H. 151. Were the different classes of workmen equipped with proper tools; were the tools kept in order?

Municipalities.

	A.	P.
Chicopee	—	Yes, for both
Danvers	Yes	Yes, by themselves
Holyoke, Peabody, Taunton, North Attleboro	Yes	Yes
Marblehead	Yes	Proper tools, and are kept in order
Westfield	....	Yes

Companies.

Mr. Adams answers in each case with a dash; Mr. Prichard, by "Yes."

H 152. With what promptness were orders to turn on current attended to?

Municipalities.

Chicopee	....	Immediately
Danvers	Usually on same day...	Reasonable
Holyoke, North Attleboro	Usually on same day...	At once
Marblehead, Peabody, Taunton	Usually on same day...	Immediately
Westfield	....	Immediate

Companies.

Abington and Rockland, Attleboro, Gardner	Usually within 24 hours	Immediate
Beverly	....	Immediate attention
Fitchburg	Usually in one day from order	At once
Northampton	....	At once
Salem	Usually within one day from order..........	Immediately, the same day
Uxbridge and Northbridge	Usually within one day from order	

H 153. Are service pipes run to every lot, whether built upon or not, prior to street paving or repaving? If so, how many of these dead services are now in existence?

Municipalities.

Chicopee	No service pipes.......	No
Danvers	No underground........	No service pipes used in the system
Holyoke	No underground lines..	Yes, in gas department. Electric overhead, no. Records of dead services kept, but number not available without research
Marblehead	No paving. Services only laid where ordered	No paving; no service pipes
North Attleboro	No service pipes.......	....

	A.	P.
Peabody	No underground	No service pipes
Taunton	No service pipes in streets	No underground
Westfield	No underground	No, as there is no underground

Companies.

Mr. Adams answers in each case, "No service pipes," except that he dashes *Beverly,* and answers for *Salem,* "Service wires overhead." Mr. Prichard indicates that there are no underground services for any plant, except that he dashes *Abington* and *Rockland,* and answers, "Don't apply," for *Beverly.*

H 154. Are records kept of services by date installed so that as the service grows old and inspection may be made at intervals of years to determine when renewals should take place, and insure such renewals before most of the services have begun to give trouble?

Municipalities.

Chicopee, Westfield		No
Danvers, Taunton	Yes	No
Holyoke	No	Records kept
Marblehead	No	No services
North Attleboro	A record of the date when each service is installed is kept	No, as there is no underground
Peabody	No	No underground

Companies.

Mr. Adams answers, "No," for all plants except *Beverly* and *Northampton,* which he dashes. Mr. Prichard answers, "No underground," for *Attleboro* and *Salem;* "Don't apply," for *Beverly* and *Gardner;* "No," for *Fitchburg,* and dashes *Abington* and *Rockland* and *Northampton.*

H 155. Are there any regulations in force regarding the entrance of employees in houses? If so, attach a copy.

Municipalities.

Mr. Adams indicates that there are none for all municipalities except *Chicopee* and *Westfield,* which he dashes. Mr. Prichard answers, "No," in each case except:

Holyoke. No printed regulations.

Marblehead. No printed instructions.

Companies.

Mr. Adams answers, "No," for all but *Beverly, Fitchburg, Northampton,* in which case he answers with a dash. Mr. Prichard answers, "No," in each case except *Salem,* for which he answers, "No printed regulations."

H 156. Does any one inspect the work done by employees in consumers' houses?

H 157. If so, is this inspection general, or does it include every job?

Municipalities.

	H 156. A.	H 156. P.		H 157. A.	H 157. P.
Chicopee		Yes	*Chicopee*		General
Danvers	By the manager	By the manager	*Danvers*	Usually every job	Every job
Holyoke, Taunton	No	No	*Holyoke, Taunton*		No
Marblehead	Yes	Yes	*Marblehead*	Every job	General
North Attleboro	Yes	No	*North Attleboro*	Every job	None
Peabody	Not as a rule	No	*Peabody*		None
Westfield		No	*Westfield*		None

Companies.

	H 156. A.	H 156. P.		H 157. A.	H 157. P.
Abington and Rockland	No	No	*Abington and Rockland*		
Attleboro, Gardner	No	Yes	*Attleboro, Gardner*		Every job
Beverly		No	*Beverly*		No
Fitchburg, Northampton		Yes	*Fitchburg, Northampton*		Every job
Salem	Yes, the foreman	Yes	*Salem*	Every job	Every job
Uxbridge and Northbridge	No such work done		*Uxbridge and Northbridge*		

FINANCIAL MATTERS

Massachusetts Electricity Works

(Schedule IV)

By ALTON D. ADAMS and CHARLES F. PRICHARD

(Note.—Mr. Adams and Mr. Prichard each prepared a schedule for each plant, except that Mr. Prichard prepared no schedule for the private plant, Uxbridge and Northbridge, and his schedule for Abington and Rockland is not included in this compilation. In cases where the same answer is made to a given question by the two experts that answer is given without distinguishing marks; where the two answers differ they are both given and distinguished by having the initial of the investigator attached to each.)

I—FINANCIAL MATTERS.

I 1. Rates and charges.

The fiscal year for all plants in Massachusetts, public and private, ends on June 30. Data for the fiscal year ending June 30, 1906, in all reports.

Municipalities.

Chicopee. 11.85 per K. W. hour for incandescent commercial service; $2\frac{1}{4}$ to $6\frac{3}{4}$ per K. W. hour for power service.—P.

Danvers. 10 cents per K. W.—on power service. If customer's gross bill amounts to $50, he receives 50 per cent. discount. Below $50 no discount is given.—P.

Holyoke. 12 cents flat per K. W. H. for lighting, 2 cents flat per K. W. H. discount before the 10th of the month. For power, 5 cents per K. W. H., with the following discounts: On bills of $10 or less per month, 20 per cent.; from $10 to $20, 25 per cent.; from $20 to $35, 33 1-3 per cent.; from $35 to $50, 40 per cent.; from $50 to $100, 50 per cent; over $100, 55 per cent. Net rates, 150 H. P., 2 1-10 cents per K. W. H.; 200 H. P., 1 8-10 cents per K. W. H.; 250 H. P. or over, 1 6-10 cents per K. W. H. Minimum bill, 50 cents per month.—P.

Marblehead. 15 cents per K. W. H., with a discount of 20 per cent. for payment in 15 days; 20 cents per K. W. H. for summer customers, for bills under $5; bills of $5 and over, 15 cents per K. W. H., with a discount of 20 per cent. for payment in fifteen days. Minimum, 50 cents a month to yearly consumers; $1.50 per month to summer customers.—P.

North Attleboro. 15 cents per K. W. H. for lighting. No power furnished.—P.

Peabody. Rates of Peabody Electric Light Department in effect July 1, 1902: Incandescent lights in the town of Peabody, ¾ of a cent per ampere hour on 55 volts, and 1½ cents per ampere hour on 110 volts, or 13 cents per K. W. H. (A standard 16 candle power lamp consumes 55 watts per hour, or on 55 volts one ampere, and on 110 volts ½ ampere, so that the rate per lamp is the same in each case. The minimum charge for electric lighting service shall be six dollars per year. Incandescent lights in the town of Lynnfield shall be 15 cents per K. W. H. All incandescent lights shall be sold by meter. Arc lights, heating and power will be subject to special contract rates. The electric light department places upon the premises of a consumer the meter and other appliances necessary to connect the consumer's installation with the main line without cost to the consumer, and will keep in repair and maintain all its appliances, the customer to pay for damages done to the property. After thirty days of non-payment, a summons will be served at the premises of the delinquent and unless payment is made within ten days thereafter, together with twenty-five cents for such summons, the supply shall be cut off, and the light shall not be let on until the amount due, together with twenty-five cents for such summons, and one dollar for the cutting off and letting on is paid. A deposit to secure the payment for electricity may be required. Rates the same for power as light.—P.

Taunton. 20 cents, with discounts as follows:

10 per cent., $5 to $10.
15 per cent., $10 to $15.
20 per cent., $15 to $20.
25 per cent., $20 to $30.
30 per cent., $30 to $50.

Over $50, special rate. (Discounts in effect May 1, 1901. From printed list undated.)—P.

Westfield. 20 to 11 K. W. H. commercial arc lights, $5 monthly. $1.25 per month per 16 candle power 7 nights to 11 P. M.

$1.15 per month per 16 candle power 6 nights to 11 P. M.

$1.00 per month for 16 candle power 5 nights to 9 P. M., and one night to 11 P. M.

85 cents per month for 16 candle power 4 nights to 8 P. M., and two nights to 11 P. M.

70 cents per month per 16 candle power, three nights to 6 P. M., two nights to 9 P. M., and one night to 11 P. M.

10 candle power, 25 per cent less than these prices.

20 candle power, 20 per cent. more than these prices.

Power, 6 cents per K. W. H. with the following discounts: 1 H. P., 10 per cent.; 2 H. P., 15 per cent.; 3 H. P., 20 per cent.; 4 H. P., 25 per cent.; 5 H. P., 33 per cent.; 7½ H. P., 36 per cent.; 10 H. P., 40 per cent.; 15 H. P. and over, 42 per cent. —P.

Companies.

Abington and *Rockland.* ———————

Attleboro.

Rates for Electric Power.

K.W.H. used per month.	*Equiv. average H.P.*	*Discount (per cent.)*	*Net price per K. W. H. (cents).*	*Net price per H. P. H. (cents).*	*Net price per H. P. per year (3,000 hrs.)*	*Min. Amt. monthly bill.*
475	2.53	30	7	5.25	$157.50	$33.25
650	3.46	35	6.50	4.87	146.10	42.25
850	4.53	40	6	4.50	135.00	51.00
1,050	5.60	44	5.6	4.2	126.00	58.80
1,200	6.40	47	5.3	3.975	119.25	63.60
1,400	7.46	50	5	3.75	112.50	70.00
1,600	8.53	53	4.7	3.52	105.60	75.20
1,800	9.6	56	4.4	3.3	99.00	79.20
2,000	10.66	58	4.2	3.15	94.50	84.00
2,200	11.73	60	4	3	90.00	88.00
2,400	12.80	62	3.8	2.85	85.50	91.20
2,800	14.93	64	3.6	2.7	81.00	100.80
3,200	17.06	66	3.4	2.55	76.50	108.80
3,500	18.66	67	3.3	2.475	74.25	115.50
4,000	21.33	68	3.2	2.04	72.00	128.00
5,000	26.66	69	3.1	2.325	69.75	155.00
6,500	34.66	70	3	2.25	67.50	195.00
8,500	45.33	72.50	2.75	2.062	61.86	233.75
12,500	66.66	75	2.5	1.875	56.25	312.50

Minimum Charge.

For 10 H. P. in motors and less, $1.50 per H. P. per month.
For 11 H. P. in motors up to 24, $1.25 per H. P. per month.
For 25 H. P. in motors and more, $1.00 per H. P. per month.
(Above prices from printed list, undated.)—A.

Commercial arcs and incandescents, 10 to 20 cents per K. W. H., $1 per month, minimum. Renewals at cost. Commercial power, 7 cents to 2 cents per K. W. H., $1 per month, minimum, per H. P.—P.

Beverly. Lighting, 50 K. W. H. or less per month, 17 cents; 50 to 62.50 K. W. H. per month, 16 cents; 62.50 to 75 K. W. H. per month, 15 cents; 75 K. W. H. and over per month, 14 cents. 10 per cent. discount if paid by the 15th of month. Minimum charge, $1 per month. Power prices, 10 cents to 4 cents per K. W. H.—P.

Fitchburg. *Meter Rates.*

For incandescent and arc lights, small single-phase motors, etc., base rate, 20 cents per K. W., subject to the following discounts for bills paid on or before the 20th of the month on which such bills are rendered:

Kilowatts metered.	*Discounts.*	*Net Rate per K. W.*
Less than 25 K. W. per month......	5%	$0.19
25 to 50 " " "	10%	.18
50 " 100 " " "	15%	.17
100 " 150 " " "	20%	.16
150 " 200 " " "	25%	.15
200 " 250 " " "	30%	.14
250 " 325 " " "	35%	.13

Kilowatts metered.	*Discounts.*	*Net Rate per K. W.*
325 to 400 K. W. per month......	40%	$0.12
400 " 500 " " "	45%	.11
500 and over " " "	50%	.10

Quarterly bills must be divided by three in order to obtain same rate of discount. A minimum charge of $1 per month will be made for each meter set. A minimum monthly charge for arc lamps will be according to length of contract, as follows:

1 year or more......................	$2 per month per lamp.
6 months or more....................	3 " " " "
3 months or more....................	5 " " " "

Wiring, fixtures, lamps and meters. The company will furnish arc lamps and keep same trimmed and in repair. The company does not furnish incandescent lamps or fixtures, and does no inside wiring. Wiring necessary to connect the customer with the service of the company will be at the expense of the customer, and will be charged as service connection. Meters are set and removed without charge.

Rates for Electric Power.

Base rate, 10 cents per K. W.

Kilowatts per Month.	*Rate per Hour.*	*Rate per H. P.*
Less than 100..................	$0.10	$0.075
100 to 200.........	.09	.0675
200 to 300.........	.085	.06375
300 to 400.........	.08	.06
400 to 500.........	.075	.05625
500 to 600.........	.07	.0525
600 to 800.........	.065	.04875
800 to 1,000.........	.06	.045
1,000 to 1,200.........	.055	.04125
1,200 to 1,400.........	.05	.0375
1,400 to 1,600.........	.047	.03525
1,600 to 1,800.........	.044	.03305
1,800 to 2,000.........	.042	.0315
2,000 to 2,200.........	.04	.03
2,200 to 2,400.........	.038	.0285
2,400 to 2,800.........	.036	.027
2,800 to 3,200.........	.034	.0255
3,200 to 3,600.........	.033	.02475
3,600 to 4,000.........	.032	.024
4,000 to 5,000.........	.031	.02325
5,000 and over.........	.03	.0225

Minimum Monthly Rate for Electric Motors.

.25 H. P.........	$1.00	5 H. P........	$8.00
.50 H. P.........	2.00	6 H. P........	10.00
1 H. P.........	3.00	7 H. P........	11.00
2 H. P.........	4.00	8 H. P........	12.00
3 H. P.........	5.00	9 H. P........	13.50
4 H. P.........	6.50	10 H. P........	15.00

11 H. P.	$16.00	19 H. P.	$22.00
12 H. P.	17.00	20 H. P.	22.50
13 H. P.	18.00	21 H. P.	23.00
14 H. P.	19.00	22 H. P.	23.50
15 H. P.	20.00	23 H. P.	24.00
16 H. P.	20.50	24 H. P.	24.50
17 H. P.	21.00	25 H. P. and over.	1.00
18 H. P.	21.50		Per mo. per H. P.

A discount of 10 per cent. will be allowed from the above rates on all bills paid on or before the 20th of the month on which said bills are rendered. Rates in effect June 1, 1903. (All rates for Fitchburg, both lighting and power, taken from printed lists that have lighting undated.)—A.

Gardner. Schedule of Rates for Power.

50	K. W. per month	$0.05	per K. W.
50 to 100	" " "	.045	" "
100 " 175	" " "	.04	" "
175 " 350	" " "	.038	" "
350 " 525	" " "	.036	" "
525 " 700	" " "	.034	" "
700 " 875	" " "	.032	" "
875 " 1,050	" " "	.03	" "
1,050 " 1,225	" " "	.028	" "
1,225 " 1,400	" " "	.026	" "
1,400 " 1,575	" " "	.024	" "
1,575 " 1,750	" " "	.022	" "
1,750 " 2,625	" " "	.0215	" "
2,625 " 3,500	" " "	.021	" "

Minimum charge of $2 per month. (From printed list, undated.) Lighting, 15 cents to 6 cents per K. W. H. Contract price for lighting per year, $7.50, $9 and $10.50 for 4, 5, and 6 nights respectively.—P.

Northampton. No printed schedule. 20 cents per K. W. H. —P.

Meter Rates for Electric Power.

"There will be a uniform price of 10 cents per 1,000 watts or 7½ cents per H. P. per hour, with discounts from monthly bills, as follows:

Monthly Bills.	*Discount.*
$10	20%
15	22%
20	24%
25	26%
30	28%
35	30%
40	32%
50	34%
60	36%
70	40%
80	45%
100	50%

The minimum bill for any month for motors of less than 1 H. P. will be $2.50, and for 1 H. P. and over, $3." (Power rates from unprinted list.)

Salem. 20 cents per K. W. H., less 25 per cent. for incandescents, and 50 per cent. for Nernst and arcs. 2 cents to 10 cents per K. W. H. for small motors. $50 to $75 per H. P. per year for all day constant power, less 5 per cent. discount.—P.

Uxbridge and Northbridge. Rates. A. Price, 20 cents per K. W. H.; minimum bill, $1 per month. First 20 K. W. consumed in a month, 20 cents; second 20 K. W. consumed in a month, 19 cents; all above 40 K. W. consumed in a month, 18 cents.

The above is figured monthly, and not cumulative.

B. *Demand Rates.* Primary usage, 20 cents per K. W. H. Secondary, 12 cents per K. W. H. Minimum bill, $1 per month. Primary usage to be determined by multiplying the K. W. equivalent of the amount shown on a demand indicator by the following number of hours per month: January, November and December, 60 hours; February, October, 50 hours; March, April, September, 40 hours; May, June, July, August, 30 hours. Secondary usage equals remainder of consumption.

C. *Guaranteed Usage.* Same conditions as B except customer guarantees for one year a monthly minimum bill equal to primary usage each month, and the scale of hours is 10 less each month. Demand determined by average readings of demand indicator in November, December, January and February of each year.

D. Form for special modifications or contract.

(Rates taken from printed form undated.)—A.

I 2. Have any of the above schedules, forms, contracts, etc., differed materially from those in force during the last fiscal year? State these differences.

Municipalities.

Chicopee, Holyoke, Peabody, Taunton. No change.

Danvers. No schedules.—A. None.—P.

Marblehead. Only change during year has been adoption of a discount of 20 per cent. from previous rates for payment by 15th of month.—A.

All discounts went into force February 1, 1906. No discounts allowed previous to that date.—P.

North Attleboro. No schedules.—A. None.—P.

Westfield. No change.—A. ——— —P.

Companies.

Abington and Rockland, Fitchburg, Northampton, Taunton. No change.

Attleboro. No change during year, but maximum lighting rate has been reduced to 15 cents per K. W. H. since June 30, 1906. —A. None.—P.

Beverly. On October, 1905, the maximum rate for power was reduced from 13 1-3 cents to 10 cents per K. W. H. No other rate change during the fiscal year. September 1, 1906, the rate for arc street lamps was reduced from $100 to $90 per lamp per year.—A.

Power prices have been reduced by changing the charge from H. P. H. to K. W. H.—P.

Gardner. On January 1, 1906, the maximum rate for house lighting was reduced from 25 to 15 cents per K. W. H. January 1, 1906, store lighting reduced from 25 to 12½ cents per K. W. H.; May 1, 1906, maximum power rate reduced from 10 to 5 cents per K. W. H.—A.

20 to 12½ cents per K. W. H. for lighting, and 10 to 4 cents per K. W. H. for power.—P.

Salem. The only change in electric rates during the last fiscal year was the reduction from $100 to $95 per arc street lamp per year.—A. Discounts increased.—P.

Uxbridge and Northbridge. On June 30, 1905, the maximum meter rate of 20 cents per K. W. H. was subject to 5 per cent. discount on all over 20,000 K. W. H. and 10 per cent. discount on all over 40,000 K. W. H. per month for incandescent lighting. During the year ending June 30, 1906, the accompanying rates and schedules were adopted. (See I 1.) The power rate on June 30, 1905, was 3 to 12 cents per K. W. H., with discount of 33 1-3 per cent. on monthly bills of over $20.

I 3. Have rates fluctuated? No, except as follows:

Taunton. No.—A. No, but discounts have been decreased.—P.

I 4. Were these schedules, contracts and rules strictly enforced?

In every instance the answer is yes or the space is left blank.

I 5. Were extensions to new territory made free or were they charged for under these rates?

Municipalities.

Chicopee. Free.—A. Profitable extensions are made at above rates. No special rates to cover extensions.—P.

Danvers. Extensions usually free.—A. Moderate distance, say few hundred feet, free, or on a certain guaranteed amount per year. Extensions free. Other cases, labor free. Customer pays for material.—P.

Holyoke, Marblehead, North Attleboro, Westfield. Free.

Peabody. Free unless over private property.—A.

Extensions without charge, but in some cases guaranteed amount of business is required.—P.

Taunton. Free in streets.—A. Free.—P.

Companies.

Abington and Rockland. Made free where at all.—A.

Attleboro, Uxbridge and Northbridge. Free.

Beverly. Free.—A. ——— —P.

Fitchburg. No charge to consumers for work done in streets.—A.

No limit on commercial when business warrants. Street lights, 500 foot limit from the last lamp.—P.

Gardner. Usually free, but 10 per cent. yearly charge on cost of line in one case.—A. As above. No charge for extensions.—P.

Northampton. Free.—A. Under these rates.—P.

Salem. No charge is made to consumers for extensions for work done in the streets.—A. Free.—P.

106. Did consumer pay for damages and repairs to meters, and any other appliances furnished by the company or municipality?

No; in every case where the question is answered at all, except in Adams's report on *Uxbridge* and *Northbridge* (private), and on *Peabody* (public), answered, "No damage resulting from use."

107. Did consumer pay for connection with mains?

No, except as noted below.

Municipalities.

Danvers. No.—A. Only as specified in answer to Question 94 (?) above.—P.

Taunton. Overhead connections are free. Underground services through land of consumers are paid for by them.—A. No.—P.

Westfield. No.—A. Not on electric. From street line on gas.—P.

Companies.

Abington and Rockland. Free for overhead service. Consumer pays for underground service on his land.—A.

Attleboro. Service wires run and meters set free.—A. No.—P.

Beverly. ——— —A. No.—P.

Fitchburg. Probably.—A. No.—P.

Gardner, Northampton, Salem. No.

Uxbridge and Northbridge. Company runs to service switch free.—A.

108. Was any part of the cost of laying pipes to mains paid by consumers or property owners? If so, what?

Municipalities.

Chicopee. No pipes. Consumers did not pay for wiring in streets.—A. No.—P.

Danvers. Not usually, and only in case of long extensions.—A. Yes. See answer to Question 94 (?) as above.—P.

Holyoke. No charge to consumers for work in public streets. —A. No.—P.

Marblehead. No, not for pipes or wires in streets.—A. No.—P.

North Attleboro. No.

Peabody. Cost, if underground.—A.

Underground connections with overhead lines paid for by consumer. Overhead connections free.—P.

Taunton. Nothing outside the land of the consumer.—A. No.—P.

Westfield. Consumers pay no costs of wires in streets.—A. No, except as above.—P.

Companies.

Abington and Rockland. ——— —A.

Attleboro. No pipes. Consumer pays no part of cost of wires in streets.—A. No.—P.

Beverly. ———.—A. No.—P.

Fitchburg. No wires in pipes or conduits.—A. No.—P.

Gardner. No pipes. Usually no charge for lines.—A. Only when underground connections were desired.—P.

Northampton. Company runs free to the face of the building. —A. No.—P.

Salem. As a rule, service wires are overhead, and are paid for by the company.—A. No.—P.

Uxbridge and Northbridge. ———.

I 9. If meters or any appliances or renewals were supplied free to consumers, state what and upon what conditions.

Municipalities.

Chicopee. Exchange for old lamps free of charge. No rent for meters.—A. Meters and lamp renewals free.—P.

Danvers. Lamps at cost. No meter rent charged.—A. Meter free. No free lamp renewals. Lamp renewals at cost.—P.

Holyoke. Furnish first outfit of lamps. Charge for renewals. No rent for meters. Minimum rate 50 cents per month.—A. Free meters. First installation of lamps free. Renewals at cost.—P.

Marblehead. 10 cents per month to yearly customers, and $1 for season to others was the charge for meters.—A. Meter rent 10 cents per month to yearly consumers. $1 per season for summer customers. No free lamp renewals.—P.

North Attleboro. Lamps at cost to consumers. Meter rent 50 cents per month if energy used does not reach that amount.—A. Meters free; lamp renewals at cost.—P.

Peabody. Does not furnish renewals. No meter rent charged.—A.

Meters free, but lamps are not furnished by department either free or otherwise.—P.

Taunton. No meter rent. Incandescent lamp renewals free.—A.

Meters and lamp renewals free.—P.

Westfield. No free lamp renewals. Meter rent charged.—A. Meters free. Lamp renewals 25 cents each.—P.

Companies.

Abington and Rockland. For every $6 worth of current used, a new lamp is furnished free of charge, the old lamp being returned to the company. Lamps are distributed quarterly. No meter rent is charged as such, but a minimum charge for service is $1 per month.—A.

Attleboro. Contract customers get free renewals, but meter customers get renewals at cost price. This refers to incandescent lamps. No direct meter rent is charged, but the minimum rate for incandescent lighting is $1 per month, and for power $1 per H. P. per month.—A.

Meters free. Lamp renewals at cost.—P.

Beverly. Do not furnish lamps at all. The minimum monthly charge for commercial service is $1, and this covers the meter rent.—A.

Renewals of lamps at cost. Meters free.—P.

Fitchburg. Do not furnish lamps or renewals. No meter rent, but minimum charge of $2 to $5 per month.—A.

Meters and all appliances except incandescent lamps free. Lamps supplied to consumers by dealers.—P.

Gardner. Incandescent lamps free to meter customers, 18 cents to others. Meter rent of 10 cents per month if less than $15 gross per year is billed for lighting.—A.

Meters are free except when less than $15 per year is used. Then a meter charge of $1.20 per year, less 10 per cent., is made. Lamp renewals to meter customers free. To contract customers 18 cents.—P.

Northampton. Incandescent lamps for city buildings free. Regular price 20 cents each. No meter rent.—A.

Large consumers lamp renewals free. Others 20 cents each.—P.

Salem. Incandescent lamps free. Burned out lamps must be returned to the company with bulb in good order, otherwise renewals are charged for. No meter rent is charged, but there are minimum monthly rates of 66 cents for incandescent lamps and $2 for either arc lamps, Nernst lamps or power, less 25 per cent. discount.—A. Meters and lamps supplied free.—P.

Uxbridge and Northbridge. No free lamps under some forms of contract, but free lamps under other forms. No direct rent for meters, but minimum charge.—A.

I 10. Were rates reduced or increased between January 1, 1900, and December 1, 1905?

Municipalities.

Chicopee. The rate for commercial incandescent lighting by meter on June 30, 1906, was 11.85c. per 1,000 watt hours. Flat rate from 15 cents to $1 per month for 16 candle-power lamp. Lamp renewals free. Energy for power was sold from 2.25 cents to 11.85 cents per kilowatt hour.—A. No.—P.

Danvers. The rate for commercial incandescent lighting by meter on June 30, 1906, was 10 cents per K. W. H. Energy for power was sold for 3 cents, 5 cents and 10 cents.—A. No.—P.

Holyoke. On June 30, 1906, net lighting rate for payment by 10th of month was 10 cents per K. W. H.—A.

Marblehead. The rate for commercial incandescent lighting by meter on June 30, 1906, was 15 cents per K. W. H. to all yearly customers; 20 cents per K. W. H. to all summer customers, unless bill amounts to $5 per month, then 15 cents per K. W. H. Discount of 20 per cent. for bills paid before 15th of month.—A. No.—P.

North Attleboro. The rate for commercial incandescent lighting by meter on June 30, 1906, was 15 cents per 1,000 watt hours. —A. ——— —P.

Peabody. Customers pay for renewals. Power at 10 cents per K. W. H. The rate for commercial incandescent lighting by meter on June 30, 1906, was 15 cents per K. W. H. Minimum charge, $6 per year. In Lynnfield 15 cents per K. W. H. by meter. —A. ——— —P.

Taunton. ———.

Westfield. The rate for commercial incandescent lighting by meter on June 30, 1906, was 14 cents to large and 20 cents to small customers per K. W. H. Fans, $1.25 per month. Motor power, 5 cents per K. W. H. Discount on motor power, one horse power, 10 per cent.; 2 H. P., 15 per cent.; 3 H. P., 20 per cent.; 4 H. P., 25 per cent.; 5 H. P., 33 per cent.; 7½ H. P., 36 per cent.; 10 H. P., 40 per cent.; 15 H. P. or over, 42 per cent. On June 30, 1900, there was no meter rate, but the contract rate for 16 candle-power incandescent lights burnt every night until 11 P. M. was $1.25 each per month. When burned 6 nights per week until 11 P. M., the rate was $1.15 for 16 candle-power lamps per month.—A. Not for electricity.—P.

Companies.

No answers, except as follows:

Beverly. The rate for commercial incandescent lighting by meter on June 30, 1906, was: 500,000 watts or less, 17 cents per 1,000 watts; 500,000 to 625,000 watts, 16 cents per 1,000 watts; 625,000 to 750,000 watts, 15 cents per 1,000 watts; 750,000 and over, 14 cents per 1,000 watts.

Ten per cent. discount on all bills paid on or before the 15th of the month. Energy for power, 10 cents per K. W. H., with discounts varying according to the amount of current used per month. On June 30, 1900, the rate for arc lamps was 40 cents each per night, with discount of 10 per cent. for payment by 15th of month.—A.

Northampton. ——— —A. No.—P.

I 11. If so, to what extent?

Municipalities.

Chicopee. On June 30, 1900, the meter rate for commercial incandescent lighting was 11.85 cents per K. W. H., with free incandescent lamp renewals.—A. ——— —P.

Danvers. On June 30, 1900, the meter rate for commercial incandescent lighting was 10 cents per K. W. H.—A. None.—P.

Holyoke. On June 30, 1900, the meter rate for commercial incandescent lighting was 1¼ cents per 16 candle-power lamp hour, or about 25 cents per K. W. H. Incandescent renewals at cost. Discounts from 5 to 33⅓ per cent., according to amount used for lights by meter. Discount on arc lighting 10 per cent. for prompt payment. The rate for commercial incandescent lighting by meter on June 30, 1906, 12 cents per K. W. H., with discount of 2 cents per K. W. H. if paid before the 10th of each month. Energy for power—see I 1.—A.

From 20 cents per K. W. H. for bills less than $10; from 18¾ cents per K. W. H. for bills of $10 to $20; from 16 2-3 cents for bills, $20 to $35; from 15 cents, $35 to $50; from 12½ cents per K. W. H., $50 to $100—all to 10 cents flat per K. W. H.—P.

Marblehead. On June 30, 1900, the meter rate for commercial incandescent lighting was 15 cents per K. W. H. to yearly consumers, and on bills of more than $5 per month. 20 cents to all others per K. W. H.—A. ——— —P.

North Attleboro. On June 30, 1900, the meter rate for commercial incandescent lighting was ¾ of a cent per 16 candle-power lamp hour. Arc lamps on incandescent circuits only. Customers pay for lamp renewals.—A.

No change from inception of the plant. 15 cents, K. W. H.—P.

Peabody. On June 30, 1900, the meter rate for incandescent lighting was 13 cents per K. W. H., with 5 per cent. discount on bills paid within 15 days. Discount of 33 1-3 per cent. on quarterly bills of $30 or more. Customers pay for renewals. Power at 10 cents per K. W. H. The rate for commercial incandescent lighting by meter on June 30, 1906, was 13 cents per K. W. H. Minimum charge, $6 per year. In Lynnfield, 15 cents per K. W. H.; all by meter.—A.

A discount of 30 per cent. on bills amounting to $30 per quarter was abolished in 1902.—P.

Taunton. On June 30, 1900, the meter rate for incandescent lighting was 20 cents per K. W. H., with discount of 25 per cent. on monthly bills of $20 or more. The rate for incandescent lighting by meter on June 30, 1906, was 20 cents per K. W. H., with discount of 10 per cent. on monthly bills of $5 to $10; 15 per cent. on $10 to $15; 20 per cent. on $15 to $20; 25 per cent. on $20 to $30; 30 per cent. on $30 to $50, and special discounts on more than $50, with a minimum rate of 10 cents per K. W. hour. This scale of discounts went into operation during the year ending June 30, 1903. Lamp renewals free. Energy for power was sold at 10 cents to 2.7 cents per K. W. H., according to the amount used on June 30, 1906.—A.

Twenty-five per cent. on bills exceeding $20 was the only discount in force prior to May 1, 1901, when the present schedule was adopted.—P.

Westfield. ——— —A. Gas price reduced from $1.80 to $1.65 net per thousand cubic feet.—P.

Companies.

Abington and Rockland. On June 30, 1900, the meter rate for incandescent lighting was 20 cents per K. W. H., with 10 per cent. discount if paid before the 15th of the month. Customers pay for wiring and renewals. Lamp renewals free. Commercial arc lighting at same rate as incandescent. The rate for commercial incandescent lighting on June 30, 1906, by meter, was 20 cents per K. W. H., less discount of from 10 to 25 per cent., according to amount used, on all bills paid before the 15th of the month. Energy for power, 10 cents per K. W. H., less discount, according to amount used. Commercial arc lighting on June 30, 1906, was done at 20 cents per K. W. H., less varying discounts.—A.

Attleboro. On June 30, 1900, the meter rate for commercial incandescent lighting was 25 cents per K. W. H. Customers pay for all incandescent lamps, 25 cents each for 8 or 16 C. P. lamps. Discount from meter rate of 20 per cent. on bills for 16,000 watt hours or over. The rate for commercial incandescent lighting by meter on June 30, 1906, was 10 cents to 20 cents per K. W. H. We have now only six customers on contract, each having one 16 C. P. lamp, for which we charge from $1 to $1.50 per month. Commercial arc lighting, same rates. Energy for power was sliding discount of from .07 to .02½ per K. W., June 30, 1906. On June 30, 1900, the contract rate for arc lighting commercial was 5 to 8 cents per inch of carbon burned.—A. Yes, less than 16 K. W. H. per month was 25 cents net. If 16 or over, 20 cents net. Entire power business developed since the year 1900.—P.

Beverly. On June 30, 1900, the meter rate for commercial incandescent lighting was 25 cents per K. W. H. Customers pay for renewals nearly at cost. 10 per cent. discount from meter rates for payment within 15 days.—A.

Yes, from 22½ cents net per K. W. H. for lighting, and from 10 cents per H. P. for power.—P.

Fitchburg. On June 30, 1900, the meter rate for commercial incandescent lighting was 20 cents per K. W. H. No free wiring. Customers pay for lamps and renewals. Varying discounts allowed if paid before the 20th of each month, according to the size of the bills. The rate for commercial incandescent lighting by meter on June 30, 1906, was for arc lamps as follows: Base rate, 20 cents per K. W. H. Discount from 5 per cent. to 50 per cent. per K. W. H., according to quantity used, if bill is paid on or before the 20th of the month. Minimum charge, $2 to $5 per month, varying with length of contract. Energy for power, base rate 10 cents per K. W. Prices vary from 10 cents per K. W. for less than 100 K. W. to 3 cents for 5,000 K. W. and over. H. P. hour rates, from 7½ cents to 2¼ cents.—A.

From 20 cents per K. W. H., with discounts from 5 to 25 per cent., to 20 cents per K. W. H., with discounts from 5 to 50 per cent. Power prices decreased to one-half of those previously.—P.

Gardner. On June 30, 1900, the meter rate for commercial incandescent lighting was 25 cents, and 50 cents for shops and factories running until 6 P. M. only. Incandescent lamp renewals free to meter customers. Wiring at customer's expense. Discount from regular rates on arcs and incandescents of 10 per cent., and for shops and factories 50 per cent., if paid before the 10th of the month. Contract rate for commercial arcs, $77.78 yearly, six nights per week. The rate for commercial incandescent lighting by meter on June 30, 1906, was 15 cents per K. W. H., house lighting; 12½ to 6 cents per K. W. H., store lighting. Energy for power, graded scale from 5 cents to 2.1 cents.—A.

Reduced from time to time as per I 1 and 2.—P.

Northampton. On June 30, 1900, the meter rate for commercial incandescent lighting was 20 cents per K. W. H. Lamp renewals to contract customers free. To customers by meter, 25 cents each. The rate for commercial incandescent lighting by meter on June 30, 1906, was 20 cents per K. W. H. Lamp renewals 20 cents each. Energy for power, 10 cents per K. W. H., less discount on bills of $10 or more, from 20 per cent. to 50 per cent., according to consumption. Enclosed commercial arc lamps, $100 each per year for service to midnight, and $84 per year for service to 10 P. M.—A. ——— —P.

Salem. On June 30, 1900, the meter rate for commercial incandescent lighting was 20 cents per K. W. H. Renewals free. Wiring at cost. For arc lamps 5 per cent., enclosed arcs 50 per cent., and for incandescent lights 25 per cent. discount for prompt payment, 10 per cent. additional discount on bills for $500 per year, and a further 10 per cent. on bills over $1,000 per year. Special rates for summer resort lighting. The rate for commercial incandescent lighting by meter on June 30, 1906, was 20 cents per K. W. H., less 25 per cent. discount for prompt payment the 15th of the month bill is dated. Over $500 gross per year, additional 10 per cent. allowed. For $1,000 gross per year, another 10 per cent. Special rates to very large users. Juniper and Willows, 20 cents less 10 per cent. for prompt payment. Energy for power, small motors 5 to 8 cents per horse power by meter. Constant service, all at $50 to $75 per horse power per year. 5 per cent. discount for prompt payment the 15th. For commercial, Nernst and enclosed arc lamps, on June 30, 1906, the meter rate was 20 cents per K. W. H., less 50 per cent. for early payment in city proper and 40 per cent. at Juniper and Willows.—A.

Summer suburb reduced 10 per cent. Power rates 10 to 25 per cent. Lighting rate discounts to long hour consumers have been increased 10 to 15 per cent.—P.

Uxbridge and Northbridge. On June 30, 1900, the meter rate for commercial incandescent lighting was 20 cents per K. W. H. Customers pay for wiring; renewals 10 per cent. above cost. The rate for commercial incandescent lighting by meter on June 30, 1906, was 20 cents per K. W. When consumption is more than 20 K. W. per month, 19 cents per K. W. up to 40 K. W. All above 40 K. W., 18 cents. Demand rates primary usage, 20 cents per K. W. Secondary rate 12 cents per K. W. Energy for power 12 cents per K. W., for current equal to 25 hours' use of maximum demand per month. Six cents per K. W. in excess of 25 hours up to 50. Three cents per K. W. in excess of 50 hours' use.—A.

Municipalities.

I 12. Was the reduction voluntary, the result of law or ordinance or competition?

Chicopee. No reduction in lighting rate.

Danvers. Voluntary.—A. No reduction.—P.

Holyoke, Taunton. Voluntary.

Marblehead. Decided by the board for business reasons.—A.

North Attleboro. No reduction.—A.

Peabody. Increase of rates to large consumers, and slight increase to small consumers.—A. No reduction.—P.

Westfield. Voluntary act of department.—A. Voluntary.—P.

Companies.

Abington and Rockland. No reduction; no competition since 1900.—A.

Attleboro. No reduction by law or competition.—A. Voluntary.—P

Beverly. Voluntary.—P.

Fitchburg. There has been a reduction by law, but no competition.—A. Voluntary.—P.

Gardner, Salem. No reduction by law and no electric competition.—A. All reductions were voluntary.—P.

Northampton. Rates have not been reduced by law or electric competition.—A.

Uxbridge and Northbridge. There has been no reduction by law and no competition.—A.

I 13. If plant has undergone a change from private to public management, or vice versa, give rates just before and just after change, with dates.

Municipalities.

Chicopee. On January 1, 1896, an existing electric plant was transferred to the city of Chicopee, but this plant was devoted entirely to street lighting. But July 7, 1896, commercial lighting began at 12.85 cents per K. W. H.; lamp renewals at cost.—A.

No commercial business under private ownership.—P.

Danvers, North Attleboro, Peabody. No change.

Holyoke. Plant transferred from Holyoke Water Power Company to city of Holyoke on December 15, 1902. Up to the date of transfer the meter rate for lighting was 1¼ cents per 16 candle-power lamp per hour, equivalent to 25 cents per K. W. H., with 50 watt lamps, with discounts up to 33 1-3 per cent. for the large consumers. On June 30, 1905, the net lighting rate by meter at Holyoke was down to 10 cents per K. W. H. for all consumers.—A.

Twenty-five cents per K. W. H., with discounts from 5 per cent. to 33 1-3 per cent. according to quantity used. All night every night arc street lights, $100 per year.—P.

Marblehead. No change.—A.

Taunton. On June 30, 1897, the last day that the electric plant in Taunton was operated by a private company, the meter rate was 1 cent per 16 candle-power incandescent lamp per hour, corresponding to 20 cents per K. W. H. per 50 watt lamps, and the consumers also paid for the lamps. During the year ending June 30, 1898, Taunton made a discount of 25 per cent. on bills of $20 or more, per month, for incandescent lights at the meter rate of 1 cent per 16 candle lamp per hour, and before June 30, 1899, free lamp renewals were included at this rate. Since May 1. 1901, the meter rates for incandescent light have been the same as those named for year June 30. 1906.—A.

Rates just before (the change): By meter, 1 cent per 16 candle-power lamp per hour: contract, $1 per month per 16 candle-power; 10 per cent. discount for more than 15 lights; arcs, $7 per month per light every night to 10.30; $3.50 per month per light three nights per week; lamp renewals free to contract customers, at cost to meter customers. Rates just after the change, the same as above, with 25 per cent. discount on meter customers using $20 or more per month.—P.

Westfield. On May 31, 1899, the rate for commercial lighting was $1.25 per month for each 16 candle-power lamp burned until 11 P. M. On June 1, 1899, the town bought the electric plant, and on June 30, 1903, the lighting rate was down to 14 cents per K. W. H. for large consumers, and 20 cents for small consumers. —A.

Just before the change from private to public management, the gas price was reduced to $1.80 per thousand cubic feet from $2. Electricity was 20 cents per K. W. H. before the change.—P.

Companies.

No private plant investigated has passed from public to private ownership.

I 14. Were bills considered as liens against property or simply as bills against the consumer? Under Massachusetts law bills for electric supply, public and private, are not liens against property, but merely bills against the consumer.

I 15. How were bills collected?

Municipalities.

Chicopee. By mail.—A. By mail, personal solicitation and voluntarily.—P.

Danvers. By collector.—A. By mail and personal solicitation and voluntarily.—P.

Holyoke. Sent by mail and payable at office of department. —A. At office, by mail and collector for delinquents.—P.

Marblehead. By mail and collector.—A. By mail, personal solicitation and voluntarily.—P.

North Attleboro. By mail and collector.

Peabody. By mail.—A. By mail, over the counter and personal collection of delinquents.—P.

Taunton. By mail and collector.—A. By mail, and collector for business section and deferred payments.—P.

Westfield. By mail and personal solicitation.—P.

Companies.

Abington and Rockland, Uxbridge and Northbridge. By mail and collector.—A.

Attleboro. By mail and collector.—A. By mail, over the counter and by collector.—P.

Beverly. By mail, at office and collector for delinquents.—P.

Fitchburg. Mostly by mail.—A. At the office and by person in the case of delinquent consumers.—P.

Gardner. By mail and collector.—A. Nearly all by collector; some few by mail and at the office.—P.

Northampton. Mail and collector.—A. Monthly by mail and in person.—P.

Salem. By mail and collector.—A. By mail and collector, also paid at the office.—P.

I 16. How often were collections made?

Municipalities.

Chicopee, Marblehead, North Attleboro, Westfield. Monthly.

Danvers. Monthly.—A. Commercial bills monthly, domestic, bi-monthly.—P.

Holyoke. Monthly.—A. Monthly and some quarterly.—P.

Peabody. Monthly and quarterly.—A. Quarterly, some monthly.—P.

Taunton. Monthly and quarterly.—A. Monthly.—P.

Companies.

All the companies except the Fitchburg company collect monthly.

Fitchburg. Monthly and quarterly.—A. Monthly, quarterly, and prepayment meters.—P.

I 17. What system of accounts was used during the last fiscal year?

The system of accounts for all plants, public and private, is prescribed by the Board of Gas and Electric Light Commissioners.

I 18. By whom were the accounts audited?

Municipalities.

The accounts of the public electric plants were audited by the respective city or town auditors. In the case of *Taunton* only was there a special auditor. The cities usually have a single city auditor. The town accounts are usually audited by Board of Auditors. The expense of audit is usually borne by the town or city and not by the electric department. In the case of a special auditor, at *Taunton,* the expense was charged to the electric department.

Companies.

Abington and Rockland. Auditing department of Stone & Webster.—A.

Attleboro. Independent auditors.—A. Auditor.—P.

Beverly. Auditor.—P.

Fitchburg. Auditor selected by stockholders.

Gardner. By treasurer.—A. No.—P.

Northampton. Auditor selected by stockholders.—A. Company's auditor.—P.

Salem. By special auditor.—A. By auditor appointed by the stockholders as required by state law.—P.

Uxbridge and Northbridge. By public accountant.—A.

I 19. Who paid for this audit?

Municipalities. See I 18.

Companies.

Abington and Rockland. ———.

All others. The company.

I 20. Who selected the auditor?

Municipalities.

Chicopee. The city.—A. Board of Aldermen.—P.

Danvers. The town.—A. The town at annual meeting.—P.

Holyoke. The city council.—P.

Marblehead. The voters.—A. The town at annual meeting.—P.

North Attleboro. The town voters.—A. The town.—P.

Peabody. The town.

Taunton. The city.—P.

Westfield. The voters.—A. The town.—P.

Companies.

Abington and Rockland, Gardner. ————

Attleboro. Probably the stockholders.—A. The stockholders.—P.

Beverly, Fitchburg, Northampton and Salem. The stockholders.

Uxbridge and Northbridge. The treasurer.—A.

I 21. Was each item charged to the proper account?

Municipalities.

Chicopee, Danvers, Marblehead, Peabody, Westfield. ———.—A. Yes.—P.

Holyoke. As far as noted.—A. Yes.—P.

North Attleboro. As far as noted.—A. This plant is located under the same roof with the pumping plant of the water department. One-half of wages, fuel, management and bookkeeping is charged to the electric department, and one-half to the water department, also repairs to steam boiler plant and buildings.—P.

Taunton. ——— —A. So far as known.—P.

Companies.

Mr. Adams answers with a dash for all the private plants. Mr. Prichard answers, "Yes," for all the private plants, with the exception of the *Gardner Electric Light Company*, for which he answers, "Supposedly."

I 22. What provision was there for assuring that each item was properly charged?

Municipalities.

Chicopee. The audit and sworn report of mayor and manager to the state gas and electric commissioners.—A. The auditor's report.—P.

Danvers. Board, manager and auditor.—A. The sworn statement of the municipal light commissioners.—P.

Holyoke. The audit and the sworn report of the mayor and manager.—A. None.—P.

Marblehead. Sworn statement.—A. Sworn statement of municipal electric light commissioners.—P.

North Attleboro. The audit and sworn report to gas and electric light commissioners.—A. None.—P.

Peabody. Oversight of manager, auditor and treasurer.—A. No special provision.—P.

Taunton. The audit and the sworn reports to the gas and electric light commissioners.—A. None.—P.

Westfield. The audit and the sworn report of the manager and the municipal light board to the state commissioners.—A. None.—P

Companies.

Abington and Rockland, Salem. The audit and the inspections of the gas and electric light commissioners.—A.

Attleboro. The audit and the inspection of the gas and electric light commissioners.—A. None.—P.

Beverly and Northampton. None.—P.

Fitchburg. The audit and the inspection of the accounts by the gas and electric light commissioners.—A. None.—P.

Gardner. Inspection of the gas and electric light commissioners.—A. None.—P.

Uxbridge and Northbridge. The inspection of the gas and electric light commissioners.—A.

I 23. Were the accounts of the particular plant kept separate from all others, and from the general accounts of the city?

Municipalities.

Mr. Adams answers, "Yes," for all plants; Mr. Prichard, "Yes," for all except *North Attleboro*, which he answers, "Yes, except as explained in I 21."

Companies.

Mr. Adams answers, "Yes," for all plants; Mr. Prichard makes no answer.

124. Were expenses for the following items charged upon the books of the plant, and included in the financial returns given below (answer each separately)?

Municipalities.

	Chicopee A.	Chicopee P.	Danvers A.	Danvers P.	Holyoke A.	Holyoke P.	Marblehead A.	Marblehead P.	North Attleboro A.	North Attleboro P.	Peabody A.	Peabody P.	Taunton A.	Taunton P.	Westfield A.	Westfield P.
Taxes	No.	No	No	None	None	No	None.	No.	None	None	None	None.	None	No	None	No
Accident insurance	[1]	No	Yes	Yes	Yes.	Yes	Yes	Yes.	No	Yes	Yes	Yes	......	Yes	[6]	Yes.
Fire insurance	......	No	Yes	Yes.[4]	Yes.	Yes.	Yes	Yes.	Yes.	Yes.	Yes	Yes		Yes		Yes
Boiler insurance	......	Yes	Yes	Yes[4]	Yes.	Yes.	Yes.	Yes	Yes	Yes	Yes.	Yes		Yes	......	Yes
Water used by plant	Yes	Yes[2]	Yes.	Yes[4]	Yes.	Yes	No	No.	Yes.	No.	No	No[5]	Yes	Yes	Yes	Yes.
Claims and damages	No. damages.	None	No. damages.	None	None.	Yes	None	None	None.	Yes	None	Yes	None.	None	None	No
Gas used in plant and offices	No.	Yes.	......	None	No	No	No.	None	No.	None.	......	None	......	None	None	No
Rental of lands and buildings not owned but used	No. rental.	None.	No. rental	None.	None.	No.	None.	No.	None.	None.	None.	Yes	None.	None	None	No
Interest on bonds	Yes.	Yes.	Yes.	Yes.	Yes.	No.	Yes.	Yes.	Yes.	Yes	Yes.	Yes.	Yes.	Yes	Yes.	Yes.
Interest on liabilities	Yes.	Yes.	Yes.	Yes.	Yes.	No.	Yes.	None.	Yes.	Yes.	Yes.	Yes.	Yes	Yes.	No.	Yes.
Depreciation	Yes.	Yes.	Yes.	Yes.	Yes.	No.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes	Yes.	Yes.
Sinking funds	No.	None.[3]	Yes.	Yes.	No.	No.	Yes.	Yes.	Yes.	Yes	Yes.	Yes.	Yes.	Yes	No.	No

[1] Insurance charged in one item. [2] Regular city rates. [3] $1,600 in bonds retired each year and included in accounts. [4] 10 cents per thousand for first ten thousand each quarter, balance 6 cents. [5] Supplied by water department, about $375. [6] Insurance charged in one item

Companies.

	Abington and Rockland. A.	Abington and Rockland. P.	Attleboro. A.	Attleboro. P.	Beverly. A.	Beverly. P.	Fitchburg. A.	Fitchburg. P.	Gardner. A.	Gardner. P.	Northampton. A.	Northampton. P.	Salem. A.	Salem. P.	Uxbridge and Northbridge. A.	Uxbridge and Northbridge. P.
Taxes	Yes.	......	Yes	Yes.	Yes.	Yes	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	......
Accident insurance	Yes.	......	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	......
Fire insurance	Yes.	......	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes	Yes.	Yes.	Yes.	Yes.	Yes.	......
Boiler insurance	Yes.	......	Yes.	Yes.	......	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes	Yes.	Yes.	......	......
Water used by plant	Yes.[1]	......	Yes.[2]	Yes.	Yes.	Yes.	Yes.[4]	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	[5]	......
Claims and damages	None	......	None.	Yes	None	Yes.	Yes.	Yes.	None.	Yes.	None.	Yes.	None.	Yes	None	......
Gas used in plant and offices	......	......	......	Yes.	......	No.	......	No.	......	Yes.	......	None.	......	Yes.	......	......
Rental of lands and buildings not owned but used	None	......	[3]	Yes.	None.	Yes.	None.	Yes.	Yes.	Yes.	None.	Yes.	None.	Yes.	None	......
Interest on bonds	Yes.	......	Yes.	Yes.	Yes.	Yes.	None.	Yes.	None.	None.	None.	None.	None.	Yes.	No.	......
Interest on liabilities	Yes.	......	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	None.	Yes.	Yes.	Yes.	Yes.	Yes.	......
Depreciation	None.	......	Yes.	Yes.	No.	Yes.	Yes.	Yes.	Yes.	None.	Yes.	Yes.	Yes.	Yes.	No.	......
Sinking funds	None.	......	Yes.	Yes.	No.	None.	None.	......	None.	None.	None.	None.	None.	Yes.	No.	......

[1] Also free water from brook. [2] Most water free from river. [3] Rental for poles and flowage. [4] Also free water from river. [5] Free water from river.

I 25. When any city officer performed a service for the plant (for example, treasurer, corporation counsel) was any part of his salary charged against the plant?

Municipalities.

Both Mr. Adams and Mr. Prichard answered, "No," for all municipal plants, except that for *Danvers,* Mr. Adams answers, "No charge for services of auditor and town treasurer," and for *Peabody,* Mr. Prichard answers, "Counsel, yes; town treasurer, no."

Companies.

No answer. Question does not apply.—J. H. G.

I 26. Were there any other charges which should properly be included in expenses, but which were actually paid from other sources, and were not charged to the plant?

Municipalities.

Chicopee. No.—P.

Danvers. ——— —A. See town report.—P.

Holyoke. ——— —A. Rent of offices, which are quite extensive, and located in the city hall.—P.

Marblehead. 2,500,000 gallons of water, said to be worth 15 cents per thousand gallons.—A. Water used, 2,500,000 gallons. Rental of offices in Rechabite Building.—P.

North Attleboro. ——— —A. See answer to I 21.—P.

Peabody. Plant said to have used 2,500,000 gallons of water, worth 15 cents per thousand gallons.—A. No; excepting offices in Town Hall Building, free of charge. Water furnished without charge by water department. Auditing and treasurer.—P.

Taunton. ——— —A. Not as known.—P.

Westfield. ——— —A. No.—P.

Companies.

Adams checks the question for all private plants.

Prichard checks the question for all except *Attleboro, Beverly, Gardner* and *Northampton,* and for these he answers, "No."

I 27. Was the income account credited with services to city departments, such as current for lighting or heating of public buildings, parks, streets, open spaces, etc.?

Municipalities.

Chicopee, Holyoke. Credited with lighting of public buildings and with street lighting.—A. Yes.—P.

Danvers. Credited with lighting of public buildings, but not with street lighting.—A. Yes.—P.

Marblehead. Not credited with service for public buildings, or with street lighting.—A. No.—P.

North Attleboro. Credited with lighting of public buildings, but not with street lighting.—A. No.—P.

Peabody. Not credited for current used in public buildings, or for street lighting.—A. No.—P.

Taunton. Credited with lighting of public buildings, but not with street lighting.—A. Yes; for all but streets and open spaces.—P.

Westfield. No; no public building with electric lights except station and office. No credit for street lighting.—A. No.—P.

Companies.

Abington and Rockland, Uxbridge and Northbridge. Yes.—A.

Attleboro. Yes; except that no direct charge is made for lighting the town clock.—A. ——— —P.

Beverly, Fitchburg and Gardner. Yes.—A. ——— —P.

Northampton. Yes.

Salem. One arc lamp, current to operate the storage battery for the fire alarm and the fire alarm whistle, are furnished to the city free of direct charge.—A. ——— —P.

I 28. Name any other items that should be credited to the income account that were not on the books.

Municipalities.

Chicopee, Holyoke. ——— —A. None.—P.

Danvers. Street lighting.—A. Fire alarm service furnished free, *i. e.*, rental steam whistle and current for charging batteries. Also street lights.—P.

Marblehead. Street lighting and fire alarm whistle, and lighting public buildings.—A. Current furnished to public buildings, fire alarm whistle, and current for street lighting.—P.

North Attleboro. Street lighting.—A. Public buildings and street lighting.—P.

Peabody. Street lighting, and the lighting of public buildings, also light in houses of two engineers of the water department.—A. Fifty dollars for the light used by two engineers of the water department, in their two houses, as part of their compensation.—P.

Taunton. Street lighting.

Westfield. Street lighting.—A. None.—P.

Companies.

No answer except that for *Salem*, Adams says: "The free service above named (I 27) seems to be a part of the consideration for what money the city pays." For *Northampton*, Prichard answers, "None."

I 29. Was current supplied free to any one?

Municipalities.

All, "No," except as follows:

Chicopee, Westfield.—A.

Peabody. Two engineers of water department got light in their houses as part of their compensation.

Companies.

Abington and Rockland. To superintendent only.—A.

Attleboro. Only to manager of company.—A.

Beverly. Manager and superintendents of gas and electricity.—P.

Fitchburg and Gardner. No.

Northampton. No.—A. ——— —P.

Salem. Only to city as above (I 27-28).—A. No.—P.

Uxbridge and Northbridge. No.—A.

I 30. If so, to whom and upon what conditions?

I 31. What was the approximate value of this free service?

I 32. To what account was it debited and credited?

I 33. Has the amount been credited on the books and no further attention paid to it, or have bills been rendered with the understanding that they were not to be paid?

There is nothing in the answers to any of these questions for any of the plants except as is contained in the answers to I 28 and I 29, except that for *Peabody,* Mr. Prichard answers I 32, "By no account," and I 33, to the effect that bills are rendered without expectation that they will be paid.—J. H. G.

I 34. Was there a store-room account to which materials were charged when purchased?

Municipalities.

Chicopee. ——— —A. Yes.—P.

Danvers, Holyoke, Marblehead, North Attleboro and Peabody. No.—A. ——— —P.

Taunton, Westfield. ——— —A. No.—P.

Companies.

All "No," except:

Beverly. Yes.—P.

Northampton. Yes.—A. Charged direct to proper accounts. —P.

Salem. Yes.—A. Yes, for all except outside line materials. —P.

Uxbridge and Northbridge. Yes.—A.

I 35. What was the system of charging them out to operating accounts when used?

Municipalities.

Chicopee. ——— —A. Account credited for material used and charged to proper account, when used.—P.

Danvers. Charged to proper account when used.—A. No system.—P.

Holyoke. Charged to part of plant where used.—A.

Marblehead. No.—A. No system.—P.

North Attleboro. Charged to work where used.—A. None. —P.

Peabody. Charged to proper account when bought.—A. None.—P.

Taunton. Charged to proper accounts when purchased.—P.

Westfield. ———.

Companies.

Abington and Rockland. Charged to part of plant where used. —A.

Attleboro, Fitchburg. Charged to part of plant where used. —A. None.—P.

Beverly. Proper accounts charged as delivered from stock room.—P.

Gardner. Charged to part of plant where used.—A. ——— —P.

Northampton. To part of plant where used.—A. As above.—P.

Salem. Charged to that part of plant where used.—A. Charged to every job upon which it is used.—P.

Uxbridge and Northbridge. That part of plant where used.—A.

I 36. If there was no store-room account, how were materials charged?

This question has been answered in the preceding ones to the effect that materials were charged to proper accounts when purchased, except that for *Fitchburg*, Mr. Adams answers: "Simply charged to part of plant where used," and for *Gardner*, Mr. Prichard answers: "To proper accounts as received, and any materials used are kept account of and adjustments made as necessary."

I 37. If the plant was run at a loss, how was the deficit met?

Municipalities.

Chicopee. No deficit, taking into account the energy supplied for public use.—A. If at a loss, by an appropriation.—P.

Danvers. By an appropriation, but town made no allowance for the value of street lighting.—A. By an appropriation.—P.

Holyoke, Marblehead. No deficit, and at *Marblehead* no allowance was made for the value of energy devoted to public use, while at *Holyoke* such allowance was not necessary to avoid a deficit.—A. By appropriation.—P.

North Attleboro, Taunton. No deficit, and neither place made any allowance for the value of street lighting, as an item of income.—A. No deficit.—P.

Peabody. By town appropriation, but no allowance was made for the value of energy devoted to public use.—A. By town appropriation.—P.

Westfield. By appropriation, but no allowance was made for the value of street lighting.—A. Never been run at a loss.—P.

Companies.

For the companies, the question is answered by a dash or by "No deficit."

I 38. How did the rate of interest paid by the city compare with the rate paid by private public service companies?

Municipalities.

Chicopee. City pays 4 per cent. for bonds issued in 1895 and 3½ per cent. on bonds issued in 1901.—A. First issue of bonds amounting to $51,000, at 4 per cent. Second issue of bonds amounting to $20,000, at 3½ per cent.; $3,000 note at 3½ per cent.—P.

Danvers. City pays 4 per cent. on bonds issued in 1889 and up to 1898, and 3½ per cent. on bonds of 1899 and 1900.—A. Bonds issued at 4 per cent. (premium $850 on $20,000 bond issue).—P.

Holyoke. City pays 3½ per cent. on bonds issued in 1902-03-04 and '05, and 4 per cent. on bonds of 1903.—A. Three and one-half and 4 per cent.—P.

Marblehead. Four per cent. on bonds.—A. Bonds issued at 4 per cent. Premium of $2,687.50 on bond issue of $50,000.—P.

North Attleboro. Town pays 4 per cent. on bonds issued in 1894; 3½ per cent. on notes for 1899 and 1902.—A. Four per cent. —P.

Peabody. Town pays 4 per cent. on bonds issued in 1892.—A. Four per cent. on bonds.—P.

Taunton. City pays 4 per cent. on bonds issued in 1897 and 1898, and 3½ per cent. on bonds of 1900 and 1902.—A. Three and one-half and 4 per cent.—P.

Westfield. Town pays 3½ per cent. on bonds issued in 1899. —A. City pays 3.15 per cent.—P.

I 38 does not apply to companies. Mr. Prichard, however, answers for *Beverly,* "No interest on notes and bonds as none are outstanding."

For *Fitchburg,* "4 per cent."

For *Gardner,* "4, 5 and 5½ per cent."

For *Northampton,* "5 per cent."

For *Salem.* "4 per cent. paid."

I 39. In the case of municipal plants was any appropriation made for the plant?

Municipalities.

Chicopee. Distinct appropriations for interest payment, operating expenses, and depreciation fund.—A. Yes; in detail.—P.

Danvers. Distinct appropriations for sinking fund, depreciation fund, construction and operating expenses.—A. Yes; $20,000. lump sum.—P.

Holyoke. Distinct appropriations for interest payments, depreciation fund, and operating expenses were made on account of the plant.—A. Yes; lump sum.—P.

Marblehead. Yes, for operating expenses, interest, and depreciation fund.—A. Yes; see record (appropriation, $10,000, lump sum, and 50 bonds issued for $52,687.50).—P.

North Attleboro. Distinct appropriations for street lighting, interest payments, and depreciation fund were made on account of the plant.—A. Yes; detailed.—P.

Peabody. Distinct appropriations for depreciation fund, interest and operating expenses were made on account of the plant. —A. Yes; lump sum.—P.

Taunton. Appropriation for sinking fund, interest payments, depreciation fund, and operating expenses were made on account of the plant.—A. Yes; lump sum.—P.

Westfield. Distinct appropriations for depreciation, operating expenses, bond payments and interest were made on account of the plant.—A. Yes; lump sum.—P.

I 39 and I 40 do not apply to private plants.

I 40. Was it lump sum or in detail?

Mr. Adams answers for *Danvers* and *Marblehead,* "Detail." For other answers, see I 39.

I 41. What is the amount of the bonds or other liabilities cancelled since it began operation?

Municipalities.

Chicopee. $35,000.—A. $31,000 first issue, $5,000 second issue.—P.

Danvers. $20,500.—A. See records.—P.

Holyoke. $103,200.

Marblehead. Notes, $23,500.—A. See records.—P.

North Attleboro. $4,865.—A. "?."—P.

Peabody. No bonds cancelled, but $22,700 in notes.—A. $22,700.—P.

Taunton. No bonds cancelled, but $1,500 in notes.—A. $1,500 note.—P.

Westfield. $28,000.

Companies.

"No bonds cancelled," except as follows:

Fitchburg. No bonds.—P.

Northampton. $58,500 in bonds, by an issue of capital stock, 1902.—A. $58,000 of bonds cancelled and exchanged for stock.—P.

I 42. What provision is made for paying off the bonds when due?

Municipalities.

Chicopee. Definite part of bond issue paid yearly, as provided by statute, and included in the tax levy.—A. Provided for by taxes, $4,000 per year.—P.

Danvers. Sinking funds have been established to pay the bonds when due.

Holyoke. A certain amount of bonds is due each year, and the sum for the payment is included in the annual assessment of taxes.—A. Paid off each year in part.—P.

Marblehead, Taunton. Sinking funds.

North Attleboro. Sinking funds to pay the bonds when due.

Peabody. Sinking funds have been established to pay the bonds when due.—A. Sinking fund—$800 per year.—P.

Westfield. Four thousand dollars each year beginning June 1, 1900, included in annual tax levy and appropriated yearly by the town.—A. Four thousand dollars paid annually from earnings of the plant.—P.

Question I 42 is not answered for private plants, except that Mr. Adams notes that *Abington and Rockland* and *Attleboro* have "only cash on hand," and that the *Salem* plant has no bonds.

I 43. If there were any items omitted from any of the following accounts, state what, give amounts, actual or estimated, and state reasons why these should be included, and the methods of computing estimates.

The time allowed for this report did not permit an analysis to determine whether the amounts charged to repairs and renewals and to depreciation were more or less than enough to maintain the values of the plants; hence the true operating expenses may be greater or less than those shown for municipal and private plants.—A

Municipalities.

Chicopee. The tax rate of $19.30 per thousand for all purposes during the year may be used to compute the loss of taxes by the city.—A. ——— —P.

Danvers. Street lighting, 202,354 arc lamp hours at 3 cents per lamp hour, equals $6,070.62; 5,863 incandescent lamp hours at 53-100 of a cent per lamp hour equals $31.07. The tax rate for all purposes was $18 per thousand for the year.—A.

Holyoke. The city tax rate for all purposes was $17 per thousand for the year. During the year ending June 30th, 1902, the Holyoke Water Power Company paid a total tax, both city and state, of $4,354.20 on account of its electric plant.—A. ——— —P.

Marblehead. Street lighting for 491,379 arc lamp hours at 1.75 cents per lamp hour equals $8,599.13. 220,541 incandescent lamp hours at .44 cent per lamp hour equals $970.38. The rate of taxation in the town for all purposes was $17 per thousand. The value of energy used in town buildings was $1,927.51, at the meter rate.—A.

North Attleboro. The waterworks pumps take steam from the same boilers as do the engines of the electric plant, and no investigation was made to determine whether the division of coal and labor charges was properly made between the two plants. The value of street lighting is omitted. 962,103 incandescent lamp hours at 53-100 of a cent per lamp hour equals $5,099.15. Loss of taxes is omitted. Tax rate, $22 per thousand.—A.

Peabody. The value of water used should be included. The loss of taxes may be computed. Tax rate, $22 per thousand. The value of the street lighting, 638,867.8 arc lamp hours at 2 cents per lamp hour, equals $12,777.35. 49,223 series incandescent lamp hours at .44 of a cent per lamp hour equals $216.58. 12,316 multiple incandescent lamp hours at .3 of a cent per lamp hour equals $36.95. The value of energy used in public buildings was $2,700.02, of which $2,150.02 was based on meter readings, and $550 was an estimate.—A.

Taunton. 517,602 incandescent street lamp hours at .44 of a cent per lamp hour equals $2,277.45. 1,003,189 arc street lamp hours at 2 cents per lamp hour equals $20,063.78. The city tax rate for all purposes was $20.20 per thousand.—A. None.—P.

Westfield. Value of street lighting, 443,425 arc lamp hours at 2.3 cents per lamp hour equals $10,198.77. 25,133 incandescent lamp hours at .25 of a cent per lamp hour equals $62.83. A tax rate of $18 per thousand may be used to compute the loss of taxes by the town. The electric station and office were the only public buildings with electric light, and no charge or allowance should be made for this.—A.

I 43 is not answered for the private companies except that Mr. Prichard answers for *Northampton*, "None."

I 44. In construction work has a detailed account been kept for expenditures so that the amount expended to date is known?

Both investigators answered for each plant, public and private, "Yes," and Mr. Adams for *Taunton*, "Records have been kept and cost is known," and Mr. Prichard for *Westfield*, adds "$195,-048.07."

I 45. Have records been kept so that it is known that the total cost will exceed the appropriation before the indebtedness is incurred?

Municipalities.

Mr. Adams checks I 45 for all plants, public and private. Mr. Prichard answers, "Yes," for all municipal plants, except, "No," for *Danvers*, *Marblehead* and *North Attleboro* and "———" for *Taunton*.

Mr. Prichard checks I 45 for all private plants.

I 47, 48, 49. Other fuel, quantity and cost of each kind.

Municipalities.

Chicopee. None.

Danvers. 381.939 (l. t.) Buckwheat coal, at $2.95 per ton. Screenings, 149 tons 62 lbs. (l. t.), $2.45 per ton.—A. ———P.

Holyoke. 9,305 bushels of coke at 11.35 cents per bushel, produced by the city plant.—A.

No other municipal plant uses any other fuel.

Companies.

Abington and Rockland. 37 l. t. screenings, at $2 per ton.—A.

Attleboro. None.

Beverly. 913.36 tons (l. t.) coke, at $3 per ton. The company produced the coke, and cost was a matter of bookkeeping.—A. Coke, 1,022 tons, at $2.68.—P.

Fitchburg. 1,931 tons coke, $4.48 per ton. The company produced the coke, and cost was a matter of bookkeeping.—A. 2,162 tons coke, $3.80.—P.

Gardner. 26,909 gallons of fuel oil at 3½ cents per gallon.—A. 28,000 gallons of fuel oil for Deisel internal combustion oil engine at 3½ cents per gallon.—P.

Northampton, *Salem*. None.

Uxbridge and Northbridge. 2,253¼ l. t. Buckwheat, at $3.03 per ton.—A.

I 46. Coal used during last fiscal year for fuel.

Municipalities.

Towns.	*Anthracite or Bituminous.*	*Brand.*	*Cost per ton (2,000 lbs.) delivered.*	*Number tons (2,000 lbs.) consumed.*	
Chicopee	Bituminous	Carbon forge	$4.55 (long ton)	2,588 (l. t.)	A
Chicopee	Bituminous	Carbon forge	4.05	2,349	P
Danvers		Cumberland	4.45 (long ton)	1,113.398 (l. t.)	A
Danvers	Both	Screenings	2.18 (screenings)	334 screenings	
Danvers	Both	Buckwheat	2.62 (buckwheat)	427 buckwheat	
Danvers	Both	Cumberland	4.00 (Cumberland)	1,246 Cumberland	P
Holyoke	Bituminous	George's Creek	5.24 (long ton)	1,095.591 (l. t.)	A
Holyoke	Bituminous	Cumberland	4.68	1,227	P
Marblehead	Bituminous	Cumberland	4.10	1,227 1475/2000	A
Marblehead	Bituminous	Cumberland	4.10	1,227	P
North Attleboro		Cumberland	4.70 (long ton)	1,193 887/2240	A
North Attleboro	Bituminous	Cumberland	4.20	1,285	P
Peabody	Bituminous	Pocahontas	4.07	2,553.0093	A
Peabody	Bituminous	Cumberland	3.90	2,365	P
Taunton	Bituminous	Eureka	4.38 (long ton)	3,168 (l. t.)	A
Taunton	Bituminous	Eureka-Berwyn-White	3.91	3,548	P
Westfield	Bituminous		3.51 235/1000 (l. t.)	1.607 1060/2240 (l. t.)	A
Westfield	Bituminous	George's Creek	3.14	1,800	P

Companies.

Abington and Rockland	Bituminous	New River	$4.04½ (l. t.)	916 (l. t.)	A
Attleboro	Bituminous	Pocahontas	3.937 (l. t.)	2,752 (l. t.)	A
Attleboro	Bituminous	Pocahontas	3.51	3,030	P
Beverly	Bituminous	Cumberland	4.29 (l. t.)	1,428 (l. t.)	A
Beverly	Bituminous	Cumberland	3.82	1,599	P
Fitchburg	Bituminous	Clearfield	4.232 (l. t.)	1,899 (l. t.)	A
Fitchburg	Bituminous and coke	Gas—Westmoreland	4.15 gas coal 3.96 coal 3.80 coke	5,037½ gas. 2,127 electricity	P
Gardner	Bituminous	New River	4.42 (l. t.)	939 (l. t.)	A
Gardner	Bituminous	Cumberland	3.86	1,051	P
Northampton	Bituminous		4.06 (l. t.)	2,990 (l. t.)	A
Northampton	Bituminous	Victor	3.62	2,565	P
Salem	Bituminous	Cumberland	4.34 (l. t.)	4,334 (l. t.)	A
Salem	Bituminous	Maryland Coal Co. George's Creek	3.87	4,854	P
Uxbridge and Northbridge	Bituminous		4.20 (l. t.)	967½ (l. t.)	A

I 50. Give quantity and cost of water used.

Municipalities.

	Quantity.	*Cost.*
Chicopee		$858 45
Danvers	—A.	233 23
Holyoke	Mostly from river.—P.	78 37 from city mains
Marblehead	Town water not charged.—A.	
	Unknown.—P.	—P.
North Attleboro	Paid $75 for condensing water from pond. Boiler water from town supply not charged.—A.	75 00—A.
	Unknown.—P.	Nothing charged.—P.
Peabody	Two and one-half million gallons town water. Value said to be $375.—A.	No charge.
	—P.	375 00—P.
Taunton	Nearly all of water taken from river at no cost.—A.	53 71—A.
	Mostly from river.—P.	53 71, nominal quantity—P.
Westfield	Most of water taken from river free of cost.—A.	50 10

Companies.

Abington and Rockland		39 18, also free water from brook.—A.
Attleboro	Mostly free water from river.—A.	19 27 city water—A.
		0.00.—P.
Beverly		806 98—A.
		—P.
Fitchburg	Condensing water from river.—A.	592 50 for boilers.—A.
		592 50—P.
Gardner	Cheap water from lake.—A.	90 00
Northampton		30 78
Salem	Sea water for condensing.—A.	672 36 for boiler water.—A.
		672 36—P.
Uxbridge and Northbridge	Unknown.—A.	Probably from river free of cost.—A.

I 51 and 52. (Contracts for public lighting) do not apply to the municipal plants.

I 53. What were the provisions of the contract between the private company and the city for public electric lighting of all kinds? Attach here a copy of contract.

Companies.

Abington and Rockland, Attleboro, Beverly, Gardner, Salem, Uxbridge and Northbridge. ———

Fitchburg. 318 enclosed arc lamps operating with 6 6-10 amperes each arc in use 3,935 hours per year on the streets, at $100 per year each.—A. Cannot furnish.—P.

Northampton. Contract for three years made in 1905. 24 6 6-10 ampere enclosed arc lamps operating 3,885 hours, $100 per year each. 105 6 6-10 ampere enclosed arc lamps operating 2,009 hours, $74 per year each. 35 incandescent lamps of 40 candle-power each, operating 2,009 hours, $19 per year each. Incandescent lights in city buildings, 15 cents net per K. W. H. and free renewals.—A.

Three-year contract, $100 for 6 6-10 all night every night, and $74 for 6 6-10 amperes every night to 12.—P.

I 52. Number of years for which contract is made and date when made.

Abington and Rockland. None. Light from year to year.—A.

Attleboro. No contract for definite time.—A.

Beverly. September 1, 1906, five years, $90 per light; previously $100 per light.—P.

Fitchburg. Contract for six years, made in April, 1902.—A. Six years, 1902.—P.

Gardner. No contract.—A. No contract, arrangements stand from year to year.—P.

Northampton. Three years; 2,006 hours and 3,866 hours for different lamps.—A. Three years, August 15, 1903.—P.

Salem. Made for five years.—A. Five years from April 1, 1906.—P.

Uxbridge and Northbridge. Uxbridge, five years from July 1, 1905. The Northbridge contract, five years from May 1, 1904, makes the price of 25 candle-power street lamps, operating 1,285 hours per year, $12 per lamp year, and the price of 25 candle-power lamps, operating 1,849 hours per year, $14.50 per lamp year. The Uxbridge contract fixes the rate of $14.50 per lamp year for 25 candle-power lamps, operating 1,849 hours yearly. Lighting of public buildings at meter rates.—A.

I 53 and 54. Total number of hours each style of lamp was lighted during the year.

Municipalities.

Chicopee. 2,999 hours for each style of lamp.—A. ——— —P.

Danvers. 1,621 hours for each style of lamp.—A. ——— —P.

Holyoke. 3,914 hours for each style of lamp.—A. 3,914.—P.

Marblehead. 3,189 hours for each style of lamp.—A. ——— —P.

North Attleboro. 1,571½ hours each style of lamp.—A. ——— —P.

Peabody. Series, 3,398 45-100 hours. Multiple, 3,079 hours. —A. ——— —P.

Taunton. 3,778 for each style of lamp.—A. 3,778 during the past year (?).—P.

Westfield. 3,878 25-100 hours for each style lamp on the streets.—A. ——— —P.

Companies.

Abington and Rockland. 1,679 hours each style of lamp. Each arc lamp was enclosed and operated with 6 6-10 amperes.—A.

Attleboro. 1,855 hours each style of lamp, except that five arcs operated only from 1 A. M. to daylight.—A. 1,855.—P.

Beverly. 3,807 hours for each style of lamp.

Fitchburg. 3,935 hours for each style of lamp.

Gardner. 1,747 hours for each style of lamp.

Northampton. Some lamps 3,885 hours, and other lamps 2,009 hours per year.—A. All night every night, 3,885 hours; 12 o'clock every night, 2,009 hours.—P.

Salem. 3,861 hours for each style of lamp, and enclosed arc lamps and the 50 candle-power incandescent street lamps all operated 3,861 hours during the year on six ampere series circuits.—A. 3,861.—P.

Uxbridge and Northbridge. 1,849 hours per year for some 25 candle-power lamps, and 1,285 hours per year for other 25 candle-power lamps.—A.

I 55. Number of lamps of each style.

I 56. Price per year of each style.

Municipalities.

Numbers of lamps in public buildings not determined, except that *Westfield* has no such lamps apart from electric plant and office, and the number, as given, for *Chicopee.*—A.

Chicopee. 197 enclosed arcs and 1,117 incandescents of 16 candle-power.—A.

Danvers. (Street lamps) 130 enclosed arc lamps, and 45 incandescents of 25 candle-power.—A. ——— —P.

Holyoke. 15 of 30 candle-power, 2 of 32 candle-power, 25 of 16 candle-power—incandescents. 503 enclosed arc lamps, street lighting.—A. 503 6 6-10 ampere arc, enclosed, $80.—P.

Marblehead. 169 enclosed arc lamps and 69 incandescents, street lighting.—A. ——— —P.

North Attleboro. 613 incandescent street lights of 32 candle-power, street lighting.—A. ——— —P.

Peabody. There were 7 multiple and 184 series arc lamps, and 71 series and 4 multiple incandescent lights used for street lighting.—A. ——— —P.

Taunton. 267 enclosed arc lamps, and 160 incandescents of 25 candle-power, street lighting.—A. 267, 1,200 6.6; 160 25 candle-power.—P.

Westfield. 114 enclosed arc lamps and 7 incandescents, street lighting.—A. ———P.

Companies.

Abington and Rockland. 49 arc lamps and 125 incandescent lamps of 25 candle-power. Arc lights, $70 per year per lamp. Incandescent lights, $16 a year for 25 candle-power, street lighting.—A.

Attleboro. 101 enclosed arc lamps and 259 incandescents, 32 candle-power. $75 per year for each 6.6 ampere enclosed arc lamp. Five enclosed arc lights of 6.6 amperes each, operating from 1 A. M. until daylight, at $38.75 each per year. 32 candle-power lights at $18 per year, 64 candle-power lights at $36 per year, operating 1,855 hours per year—street lamps. Interior lighting at meter rates.—A. 101 and 5 arcs (1,200 candle-power) 6 6-10. 259 32 candle-power series, $75, $38.75 and $18.—P.

Beverly. 297 enclosed arc lamps, $90 per lamp per year.—A. 297 5-ampere a. c. enclosed arcs. To September 1, 1906, price was $100; since, $90.—P.

Fitchburg. 318 enclosed arc lamps and 63 incandescent lamps of 30 candle-power. Arc, $100 per year per lamp and $3 per year extra for Most arms. Incandescent lights, $30 per lamp per year, street lamps.—A. 3,935—$100 for arcs, $3 extra on Most arms, $30 for 32 candle-power incandescent.—P.

Gardner. 52 arc lamps, 16 incandescents. Arc, $75 per year. Incandescents, 50 candle-power, all night, $25 per year. 25 candle-power all night, $15 per year. 50 candle-power till midnight, $15 per year. The price of $75 each per year was for enclosed arc street lamps, operating 1,747 hours per year with 6 6-10 amperes. —A.

52 arcs, $75; 15 50 candle-power, $25; 1 25 candle-power, $15.—P.

Northampton. 24 all-night arcs, $100 per year. 105, twelve o'clock, $74 per year. Series incandescent lights, $19 per year, twelve o'clock, 40 candle-power lamps. City buildings, alternating current, 20 cents per K. W., less 25 per cent. discount. Open arc lamps operated with 6.8 amperes; all for street lighting.—A.

129 6 6-10 enclosed, 35 40 candle-power incandescent, twelve o'clock, $100 for 24; $74 for 105; $19 for 35.—P.

Salem. 333 enclosed arc lamps and 418 incandescents, 30 candle-power; 4 incandescents, 50 candle power. Arc lights, $95 per year for every night and all night, 6 ampere alternating current series, enclosed arc. Incandescent lights, $22 each per year per 30 candle-power series lamps, every night and all night, for street lighting.—A.

333 6-ampere enclosed arcs, 418 30 candle-power and 4 50 candle-power incandescents, $95 for 6 ampere arc, $22 for 30 candle-power incandescents.—P.

Uxbridge and Northbridge. 425 incandescent lamps of 25 candle-power each, operated in part during 1,849 hours per year, at $14.50 each, and in part 1,285 hours per year, at $12 each. 13 enclosed arc lamps operated 1,849 hours per year at $67 each, with 6.6 amperes. All street lamps.—A.

I 57. Did these prices include renewals and repairs?

I 58. Were there any other charges for public lighting?

Are not answered for the public plants, except that Mr. Prichard answers for Holyoke, "Yes" for I 57 and "No" for I 58.

Companies. "Yes" for all for I 57.

I 58. Each investigator answers "No" for each private plant, except Mr. Adams notes for *Salem*, that lighting in public buildings is at meter rates.

I 59. Did the municipalities own the lamp posts?

Municipalities. No answer except "Yes" is given for any municipal plant.

Companies. No case is noted for a private company in which the city owns the lamp posts.

J—CAPITAL STOCK AND BONDS.

J 1. As of date, end of last fiscal year, June 30, 1906.

J 2—10 (Stock) do not apply to municipal plants.

Companies	J 2 Stock authorized, statute.	J 3 Stock authorized, company.	J 4 Stock outstanding.	J 5 Stock in treasury.	J 6 Stock issued	J 7 Stock fully paid A.	J 7 Stock fully paid P.
Abington and Rockland	$80,000	$75,000	$75,000	......	$75,000	.....	.....
Attleboro	65,000	165,000	165,000	......	165,000	.....	$165,000
Beverly	40,000	154,000	194,000	A. ...... P. $194,000	194,000	.....	194,000
Fitchburg	150,000 [2]	235,000	385,000	......	385,000	......	385,000
Gardner	30,000	A. ...... P. 30,000	30,000	......	30,000	......	30,000 [1]
Northampton	A. 40,000 P. 117,400	117,400	117,400	......	117,400	.....	117,400
Salem	10,000 10,000	275,000	275,000	......	275,000	......	275,000
Uxbridge and Northbridge	Original 20,000	40,000	39,400	......	39,400	......	......

J 8. Stock issued.—P.	Date of issue.	No. of shares.	Par value.	Amt. of cash rec'd.	How secured.	Purpose.
Abington and Rockland	....	...	...	......	......	....
Attleboro	Various	1,650	$100	Par value	......	Plant and extension
Beverly	Various from 1859	1,940	100	$224,800	......	....
Fitchburg	....	7,700	50	436,000	......	....
Gardner	1891	300	100	45,000	......	Purchasing plant
Northampton	Nov., 1886	...	...	......	......	....
Salem	1888, 1892	1,174	100	117,400	......	Establishing & extending plant
	1881	100	100	10,000	......	Equipment and construction
	1882	100	100	10,000	......	Equipment and construction
	1885	200	100	20,000	......	Equipment and construction
	1886	300	100	30,000	......	Equipment and construction
	1889	700	100	70,000	......	Equipment and construction
	1892	350	100	35,000	......	Equipment and construction
	1902	1,000	100	100,000	......	Equipment and construction
Uxbridge and Northbridge	....	...	...	......	......	....

---

[1] At $150 per share. [2] June 21, 1906, additional stock issue of $110,000 authorized by the gas and electric light commissioners.

J 9. Explain how each issue of stock was disposed of, whether private sale, public auction, stock dividend, at par to stockholders, bonus, etc.

Companies.

Abington and Rockland, Uxbridge and Northbridge. All taken by stockholders.—A.

Attleboro. All taken by stockholders.—A. By subscription and to stockholders.—P.

Beverly. Private sale to stockholders at price authorized by the gas and electric light commission.—P.

Fitchburg. Mostly taken by stockholders, but a little sold at auction.—A. Taken by stockholders.—P.

Gardner. Probably all taken by stockholders. On June 30, 1891, the Gardner electric company, with stock of $28,700, had debts of over $44,000. A new corporation was formed to take the plant, and some of the old stockholders appear to have taken the $30,000 of new stock at enough to pay the debts.—A. To stockholders at $1.50 per share.—P.

Northampton. By private sale to stockholders.—A. At par to stockholders.—P.

Salem. All taken by stockholders.—A. 175,000 at par to stockholders. 100,000 at $125 to stockholders.—P.

J 10. Number of stockholders.

Companies.

Abington and Rockland.	11.—A.
Attleboro.	30.
Beverly.	46.
Fitchburg.	93.
Gardner.	14.
Northampton.	46.
Salem.	203.
Uxbridge and Northbridge.	16.—A.

J 11. Not answered for municipalities.

J 12, 13, 14, 15.

Municipalities.

	(12) *Amt. bonds authorized by municipality or company.*	(13) *Amount bonds issued.*	(14) *Amt. bonds paid.*	(15) *Bonds outstanding.*
Chicopee	$111,000	$111,000	$35,000	$76,000—A.
Danvers	69,900	69,900	......	49,400—A.
Holyoke[1]	906,000	906,000	103,200	802,800—A.
Marblehead	50,000	50,000	......	50,000—A.
Marblehead	......	......	......	50,000—P.
North Attleboro	50,000	50,000	......	50,000—A.
Peabody	40,000	40,000	......	40,000—A.
Peabody	......	......	......	40,000—P.
Taunton	320,500	320,500	......	320,500—A.
Taunton	......	......	......	320,500—P.
Westfield[1]	120,000	120,000	28,000	92,000—A.
Westfield	......	......	......	92,000—P.

---

[1] At Holyoke and Westfield the bonds were issued on account of both the gas and electric plants.

Companies.

	(11) *Amt. bonds authorized by charter or statute.*	(12) *Amt. bonds authorized by municipality or company.*	(13) *Amount bonds issued.*	(14) *Amt. bonds paid.*	(15) *Bonds outstanding.*
Abington and Rockland..	$25,000	$25,000	$25,000	......	$25,000—A.
Attleboro ...	30,000	30,000	30,000	......	30,000—A.
Attleboro ...	.....	30,000	30,000	......	30,000—P.
Beverly[5]	11,800	11,800	11,800	......	11,800—A.
Beverly	......	......	......	......	......—P.
Fitchburg ...	......	......	45,000[1]	......	15,000[1]—A.
Gardner	......	......	......	......	20,000[2]—A.
Northampton	......	58,700	58,700	58,700	......—A.
Northampton	58,000	58,000	58,000	58,000	......—P.
Salem	......	......	......	......	50,000[3]—A.
Salem	.....	50,000 debenture	50,000	......	50,000 coupon debenture bonds.—P.
Uxbridge and Northbridge	......	......	......	......	180,800[4]—A.

---

[1] Coupon notes.

[2] Ten year notes secured by mortgage on plant.

[3] Ten year coupon notes.

[4] $11,000 in coupon notes, and $169,800 mortgage notes.

[5] At Beverly and Fitchburg the stocks and bonds were issued on account of both the gas plants and the electric plants.

J 16. Bonds issued (and outstanding—P.).

Municipalities.

Date of issue.	*When due.*	*Face value.*	*Amount received.*	*Rate Int.*	*Security.*	*How to be paid.*
Chicopee—						
June 1, 1895.......	$3,000 yearly	$81,000	....	4%	....	$3,000 yearly
June 1, 1901.......	$1,000 yearly	30,000	$126,699.00 including the sum received for $11,500 in notes.	3½%	City taxable property	$1,000 yearly —A
June 1, 1895.......	$3,000 yearly	81,000	$126,699.50	4%	Taxable property of city	$3,000 retired yearly
June 1, 1901.......	$1,000 yearly	......		3½%	Same	$1,000 retired yearly —P
Danvers—See J 18.—A.						
Feb. 1, 1889.......	1899	15,000	....	4%	....	Retired
June 1, 1896.......	1916	11,000	....	4%	....	....
June 1, 1897.......	1917	4,000	$71,477.04	4%	Taxable property	Sinking funds
July 1, 1898.......	1928	5,500	.... (total)	4%		
Apr. 1, 1899........	1929	4,000	....	3¼%		Retired
Apr. 1, 1900........	1930	1,500	....	3¼%		Retired —A.
June 1, 1896.......	1916	11,000	From No. 16-18 $77,027.04 Par, $75,450 Prem. 1,577.04			
				4%	....	Sinking fund
June 1, 1897.......	1917	4,000		4%	....	Sinking fund
July 1, 1898.......	1928	5,500		4%	....	Sinking fund
		Retired.				
Feb. 1, 1889........	1899	15,000	....	4%	....	Sinking fund
Apr. 1, 1899........	1929	4,000	....	3¼%	....	Sinking fund
Apr. 1, 1900........	1930	1,500	....	3¼%	....	Sinking Fund.—P.
Holyoke—						
Dec. 1, 1902.......	Yearly.	720,000	Total $916,322.71	3½%	Taxable property	$24,000 each year for 30 years
Nov. 1, 1903.......	Nov. 1, 1904	17,000		4%		Retired
Oct. 1, 1903.......	Yearly.	36,000		3½%		$3,600 each year
Nov. 1, 1904.......	Yearly.	30,000		3½%		$2,000 each year $5,000 each year
Apr. 1905..........	Yearly.	73,000		3½%		$5,000 each year
Sept. 1, 1905.......	Yearly.	30,000		3½%		$2,000 each year —A.

Date of issue.	*When due.*	*Par value.*	*Amount received.*	*Rate Int.*	*Security.*	*How to be paid.*
Dec. 1, 1902.......	$24,000 yearly	720,000	$886,263.61	3½%	Taxable property	$24,000 each year
Nov. 1, 1902.......	Nov. 1, 1904	17,000		4%		....
Oct. 1, 1903.......	$1,000 yearly	36,000		3½%		....
Nov. 1, 1904.......	$2,000 yearly	50,000		3½%		....
Aug. 1, 1905.......	$5,000 yearly	75,000		3½%		....
Sept. 1, 1905.......	$2,000 yearly	30,000	$30,029.10	3½%	Taxable prop'ty	.... —P
Marblehead—						
July 1, 1894.......	July 1, 1924	50,000	$52,687.50	4%	Taxable prop'ty	Sinking fund —A.
July 1, 1894.......	July 1, 1924	50,000	$52,687.50	4%	Real estate contained in town	Sinking fund; $1,000 annually —P
North Attleboro—						
Jan. 1, 1894.......	30 years	50,000	(total) $50,737.50	4%	....	Sinking fund —A.
Jan. 1, 1894.......	30 years	50,000	$50,737.50	4%	....	Sinking fund; $1,000 per year —P
Peabody—						
June 1, 1892.......	June 1, 1922	40,000	$63,440.00 from bonds and $22,000 notes	4%	Taxable prop'ty	Sinking fund —A.
June 1, 1892.......	June 1, 1922	40,000	....	4%	Real estate in the town	Sinking fund; $800 per year. —P.
Taunton—						
June 1, 1897.......	June 1, 1927	125,000	(total, less $1,500 note) $344,191.60	4%	Taxable Property	Sinking Funds. —A.
June 1, 1897.......	June 1, 1917	7,500		4%		
June 1, 1898.......	June 1, 1918	3,500		4%		
Dec. 1, 1898.......	Dec. 1, 1928					
Dec. 1, 1900.......	Dec. 1, 1920	5,000		4%		
June 1, 1901.......	June 1, 1911	3,000		3½%		
June 1, 1902.......	June 1, 1932	1,500		3½%		
		175,000		3½%		
June 1, 1897.......	June 1, 1927	125,000	....	.....	....	....
June 1, 1897.......	June 1, 1917	7,500	....	.....	....	....
June 1, 1898.......	June 1, 1918	2,500	....	.....	....	....
Dec. 1, 1898.......	Dec. 1, 1928	5,000	$342,691.60 (total)	.....	....	....
Dec. 1, 1900.......	Dec. 1, 1920	3,000		.....	....	....
June 1, 1901.......	June 1, 1911	1,500		.....	....	....
June 1, 1902.......	June 1, 1932	175,000		.....	....	.... —P

Date of issue.	*When due.*	*Face value.*	*Amount received.*	*Rate Int.*	*Security.*	*How to be paid.*
Westfield—						
June 1, 1899.......	$4,000 each year beginning 1900	$120,000	$124,558.80	3½%	Taxable property.	$4,000 each year —A
June 1, 1899.......	$4,000 annually	120,000	$124,558.80	3½%	Taxable property of town	$4,000 each year —P
			Companies.			
Abington and Rockland.						
Apr. 1, 1899.......	Apr. 1, 1919	$25,000	$25,000.00	5%	First mortgage	.... —A
Attleboro—			(Amount)			
Dec. 1, 1899.......	Dec. 1, 1919	......	$30,000.00	5%	....	.... —A
Dec. 1, 1899.......	1919	30,000	....	5%	First mortgage	Sinking fund —P
Beverly (special stock).						
Dec. 16, 1880.......	....	11,800	....	6%	By assets of Co.	.... —A
Fitchburg—	No bonds issued	......	....	.....	....	.... —A
Gardner—	No bonds issued	......	....	.....	....	.... —A
Northampton—						
No bonds outstanding, bonds of $58,500, with 6% interest, retired in 1902.—A.						
1894	1914	58,000	$58,000.00	6%	First mortgage	By cash —P
Salem—	No bonds issued	.....	....	......	....	.... —A
May 1, 1901.......	May 1, 1911	$50,000	$50,000.00	4%	Unsecured	By company —P
Uxbridge and Northbridge...............	No bonds issued	......	....	.....	....	.... —A

J 17. Explain how each issue of bonds was disposed of, whether private sale, public auction, bond dividend, etc.

Municipalities.

Chicopee and Westfield. ——— —A. Public auction.—P.

Danvers, Holyoke, Marblehead, North Attleboro, Peabody. Private sale.—P.

Taunton. ——— —A. Advertised sale.—P.

Companies.

Abington and Rockland. Attleboro. Private sale.

Beverly. Gardner, Uxbridge and Northbridge. ————

Fitchburg. No bonds.

Northampton. Probably by private sale.—A. To stockholders at par.—P.

Salem. ——— —A. Private sale.—P.

J 18. State amount and character of other funded debts, if any.

Municipalities.

Date of issue.	*When due.*	*Face value.*	*Amount received.*	*Rate Int.*	*Security.*	*How to be paid.*
[illegible]—Notes outstanding, $9,000—A.						
July 15, 1896......	July 15, 1906	$6,000	....	4%	....	....
Dec. 18, 1901	Dec. 1, 1910	3,000	....	3½%	....	.... —A
			Original issue.			
Mr. Pritchard states there is no other funded debt and then names the following items:						
July 15, 1896 ...	July 15, 1906	$6,000	....	4%	....	Appropriation
Dec. 18, 1901......	Dec. 18, 1910	3,000	....	3½%	....	Appropriation —P
Danvers—Notes.			(total)			
Apr. 1, 1906.......	1907	5,500	$5,500.00	4%	....	....
Nov. 1, 1905.......	1906	50	....	4%	....	.... —A
Danvers—Bonds.						
Apr. 1, 1901.......	1931	$5,500	See total (J 16)	4%	Taxable prop'ty	Sinking funds —A.
Apr. 1, 1903.......	1918	2,000	See total	4%	Taxable prop'ty	Sinking funds —A.
Apr. 1, 1904.......	1919	1,100	See total	4%	Taxable prop'ty	Sinking funds —A.
Apr. 1, 1905.......	1915	20,000	See total	4%	Taxable prop'ty	Sinking funds —A.
Apr. 1, 1901.......	1931	5,500	....	4%	....	By tax levy
Apr. 1, 1903.......	1918	2,000	....	4%	....	....
Apr. 1, 1904.......	1919	1,400	....	4%	....	....
Apr. 1, 1905.......	1915	20,000	....	4%	....	....
Nov. 1, 1905.......	1906	50	....	4%	....	....
Apr. 1, 1906.......	1907	5,500	....	4%	....	.... —P
Holyoke—None.						
Marblehead—All such debts paid.—A.						
North Attleboro—						
July 1, 1899.......	20 notes, due 1 each year	13,900	$13,900.00	3½%	....	$695 each year
July 25, 1902......	Dec. 15, 1907	3,000	3,000.00	3½%	....	.... —A
			original issue.			
July 1, 1899.......	$695 each year	9,035	9,035.00	3½%	....	Tax levy
July 25, 1902......	Dec. 15, 1907	3,000	3,000.00	3½%	....	Tax levy —P
Peabody—Notes paid.						
Aug. 11, 1893......	....	6,700	....	5%	....	$1,000 each year
Aug. 11, 1895......	....	6,000	....	4%	....	$2,000 each year
Nov. 16, 1897......	....	2,000	....	4%	....	$1,000 in 1899, 1900
Nov. 20, 1901......	....	8,000	....	3½%	....	$2,000 each year —A
Taunton—No other (funded debt).						
Mar. 1, 1900.......	Oct. 1, 1901	$1,500	....	4%	....	Paid Oct., 1901 —A
Westfield—	....	......	....	.....	....	....

Companies.

Date of issue.	*When due.*	*Face value.*	*Amount received.*	*Rate Int.*	*Security.*	*How to be paid.*	
Abington and Rockland—Notes.							
June 30, 1906......	Sept. 1, 1906	$4,000	....	5%	....	....	—A
Attleboro—No other funded debts.—A.							
Beverly—$6,000 notes, dates not given.—A.							
Fitchburg—$45,445, notes.							
Dec. 1, 1898.......	Dec. 1, 1908	$35,000	....	4%	Only company	....	
Dec. 1, 1899.......	Dec. 1, 1909	10,000	10,000.00	4%	Only company	....	
Mar. 1, 1905.......	Demand	445	....	5%	H. F. Coggshall	....	—A
Gardner—Notes, $47,300 outstanding.—A.			A.				
July 1, 1905.......	10 years	......	$20,000.00	4%	Mortgage on plant	....	
Aug. 9 to Jan. 5, 1906	Demand	......	12,000.00	5%	....	....	
Jan. 5 to June 30..	Demand	......	4,050.00	5%	....	....	
May 28............	July 30, 1906	......	7,000.00	5½%	....	....	
Apr. 12............	Demand	......	3,500.00	5½%	....	....	
June 30, 1906......	Demand	......	750.00	5%	....	....	—A
July 1, 1905.......	10 years	$20,000	20,000.00	4%	First mortgage	....	
Various	Demand	16,800	16,800.00	5%	First mortgage	....	
Various	Demand	10,500	10,500.00	5½%	....	....	—P
		$47,300					
Northampton—No.—P. Note for $1,000, dated October 5, 1905, due October 5, 1906, interest 5%.A—							
Oct. 5, 1905.......	Oct. 5, 1906	$1,000	$1,000.00	5%	....	Earnings	—P
Salem—One note issue (ten year coupon notes).—A.							
May 1, 1901.......	May 1, 1911	......	$50,000.00	4%	Unsecured	....	—A
May 1, 1901.......	May 1, 1911	$50,000	50,000.00	4%	Unsecured	By company	—P

Uxbridge and Northbridge—Coupon mortgage and other notes payable.—A.

Date of issue.	*When due.*	*Face value.*	*Amount received.*	*Rate Int*	*Security*	*How to be paid*
Oct. 28, 1901	Demand		$18,800.00	5%	Mortgage	
Dec 1, 1903	Dec 1, 1913		151,000.00	6%	Mortgage	
Aug 1, 1905	Aug. 1, 1915		11,000.00	5%		
Aug. 26, 1905	Demand		191.00	5%		
Aug 28, 1905	Demand		123.30	5%		
Aug 26, 1905	Demand		49.31	5%		
Sept. 1, 1905	Demand		275.00	5%		
Nov. 29, 1905	Demand		2,160.00	5%		
Nov. 29, 1905	Demand		540.00	5%		
Nov. 29, 1905	Demand		887.50	5%		
Nov. 29, 1905	Demand		400.00	5%		
May 25, 1906	Demand		1,057.50	5%		
Jun. 20, 1906	July 20, 1906		1,700.00	6%		
May 25, 1906	July 5, 1906		250.00	6%		
May 25, 1906	July 5, 1906		250.00	6%		
June 21, 1906	July 21, 1906		300.00	6%		
May 25, 1906	Aug. 6, 1906		250.00	6%		
May 25, 1906	Aug. 6, 1906		250.00	6%		
Sept. 6, 1905	Sept. 6, 1906		275.00	5%		
May 25, 1906	Sept. 10, 1906		221.89	5%		
May 25, 1906	Sept. 5, 1906		250.00	6%		
May 25, 1906	Sept. 5, 1906		250.00	6%		
May 25, 1906	Oct. 8, 1906		221.87	5%		
May 25, 1906	Oct. 5, 1906		250.00	6%		
May 25, 1906	Oct. 5, 1906		250.00	6%		
May 25, 1906	Nov. 8, 1906		221.87	5%		
May 25, 1906	Dec. 10, 1906		221.87	5%		—A
			$191,946.11			

NOTE.—It is uncertain how far the sums represented by notes, paid and to be paid, have gone into the new construction of the plants, public or private.—A.

J 19. If funds have been secured from any other sources for the construction or extension of plant, give amounts, dates and sources fully.

Municipalities.

Chicopee:		
Appropriation for construction		$33,192 61
Danvers:[1]		
Appropriation for construction		7,916 87—A.
Appropriation		9,246 97—P.
Holyoke:		
Appropriation for construction		28,595 41
Over-drafts for construction		90,695 71—A.
Appropriations, various dates		........—P.
Marblehead:		
Appropriations for construction		51,717 82
Over-draft for construction		1,065 27—A.
Appropriations at various dates amounting to		75,217 82—P.
North Attleboro:		
Appropriations for construction		23,145 40—A.
Construction appropriations, various dates	$23,145 40	
Note appropriations, various dates	4,865 00	
		28,010 40—P.
Peabody:		
Appropriations and over-drafts for construction		49,808 91—A.
Appropriations for construction		45,745 14
Construction over-drafts		4,663 77
For note payments		22,700 00—P.
Taunton:		
Appropriations for construction		15,901 75—A.
By note paid by appropriation		1,500 00
By note paid by appropriation		15,901 75—P.
Westfield:[1]		
Appropriation for construction		41,000 00—A.

Companies.

J 19 is not answered for companies, except that for *Fitchburg* Mr. Adams answers "premium on stock, $66,000"[1]; and for Salem, "Premium on stock issue of 1902, $25,000." and Mr. Prichard answers for *Northampton*, "Oct. 5, 1905, note for $1,000, due Oct. 5, 1906, 5 per cent. interest, unsecured."

J 20. What provisions have been made for payment of liabilities when due?

Municipalities.

The annual payments of debts or into sinking funds must be raised by taxation, if not earned from private service.—A.

Chicopee. Yearly tax levy and appropriation.—A. By tax levy.—P.

Danvers. A sinking fund for bonds.—A. Sinking fund of $3,000 annually, raised by taxation.—P.

Holyoke. Tax levy and annual appropriations by city government.—A. Annual appropriations by city government.—P.

Marblehead. Sinking fund for bonds.—A.

---

[1] It is uncertain how these sums are to be divided between the gas and electric plants.—A.

North Attleboro. Sinking fund for bonds.—A. Sinking funds and appropriations.—P.

Peabody and Taunton. Sinking fund for bonds.—A. Sinking fund.—P.

Westfield. Annual tax levy and appropriation.—A. Paid from earnings from plant.—P.

Companies.

Abington and Rockland, Uxbridge and Northbridge. No definite provision, but there is $12,664 cash on hand for Abington and Rockland Co.—A.

Attleboro. Sinking fund of $3,000, and there is $19,849 cash on hand.—A. Sinking fund.—P.

Beverly. No definite provision, but company holds $31,000 in notes receivable, and has $4,958 cash on hand.—A. Earnings and reserve fund.—P.

Fitchburg. No definite provision, but the company has $21,490 cash on hand.—A. New stock issued.—P.

Gardner. No definite provision.—A.

Northampton. No definite provision, but company has $11,123 cash on hand, and investment property valued at $7,000.—A. No provision.—P.

Salem. No definite provision, but company has $15,050 cash on hand.—A. None.—P.

J 21. What provisions have been made for payment of interest on bonds?

Municipalities.

Chicopee. Earnings, yearly tax levy and appropriations. The statute provides that the interest on the town and city debts must be raised annually by taxation, unless covered by the estimated earnings from private service.—A. By tax levy.—P.

Danvers. Earnings and tax levy.—A. Tax levy.—P.

Holyoke. Earnings of plant and annual tax levy.—A. Appropriation and earnings of plant.—P.

Marblehead. Tax levy and earnings.—A. Tax levy.—P.

North Attleboro. Earnings of plant and annual tax levy.—A. Tax levy.—P.

Peabody. Yearly tax levy and earnings.—A. Raised by taxation.—P.

Taunton. Yearly tax levy and earnings.—A. Appropriation from tax levy.—P.

Westfield. Earnings of plant and annual tax levy.—A. Paid from the earnings of the plant.—P.

Companies.

Abington and Rockland, Uxbridge and Northbridge. ——— —A.

Attleboro. No definite provision.—A. Earnings.—P.

Beverly. No definite provision.—A. ——— —P.

Fitchburg and Salem. No bonds.—A. Earnings.—P.

Gardner. ——— —A. Earnings (notes only).—P.

Northampton. None.—P.

Chicopee.

K—Assets.

K 1. As of date, end of last fiscal year, June 30th, 1906.

		A.	P.
K 2.	Cash on hand..............	$19,740.85	$20,156.37
K 3.	Notes receivable, accts. receivable and jobbing......	696.92	696.92
K 4.	Sundry accounts due (Light and Power.—A.).........	3,570.82	3,570.82
K 5.	Depreciation fund	415.52	......
K 6.	Patent rights	......	......
K 7.	Office furniture	81.12	81.12
K 8. K 9.	Land and buildings, real estate	27,963.31	16,754.70
K 10.	Steam plant	47,850.44	33,188.90
K 12.	Electric plant	22,129.74	14,633.57
K 13.	Lines (overhead)...........	30,229.90	20,254.06
K 14.	Transformers	9,073.34	6,801.05
K 15.	Meters	8,012.19	5,827.13
K 16.	Services. (included with lines.—A.)		......
K 17.	Lamps and globes..........	11,217.40	......
K 17a.	Lamps (arc)	......	7,143.29
K 18.	....	......	......
K 19.	Fuel on hand..............	1,820.00	18,020.00
K 20.	Carbons on hand...........	147.25	147.25
K 21.	Arc lamps on hand.........	......	......
K 22.	Incandescent lamps on hand..	202.97	202.97
K 23.	Globes and other electrical fixtures on hand...........	1.198.97	......
K 23a.	Globes	......	94.22
K 24.	Tools and appliances........	1,751.32	......
K 25.	Miscellaneous supplies on hand, oil and waste......	65.59	......
K 25a.	Oil and waste.... $65.59 Miscellaneous .... 1,004.75 Tools, appliances.. 1,751.32 Horse and wagons 1,749.92	......	4,671.58
K 26.	Sinking fund.............	......	......
K 27.	Other assets...............	......	......
K 28.	Other capital assets.........	......	......
K 28a.	Other capital assets, horse and wagons	1.749.92	......
K 29.	Total assets	$187,917.57	$136,043.95
	Profit and loss balance....	......	$24,695.33
		......	$160,739.28

K 30. Do the values above given represent the original cost of the present assets, their present market value, or cost of duplication? Values given for real estate, steam plant, electric plant, lines, transformers, meters and arc lamps, represent the total sums charged as costs of these items since the municipal plant was started, and the values of other items are taken from the statement of assets made by the municipality; all as contained in the report to the Gas and Electric Light Commissioners, dated June 1st, 1906.—A.

Original cost, less depreciation values.—P.

L—LIABILITIES.

L 1. As of date, end of last fiscal year, June 30th, 1906.

		A.	P.
L 2.	Appropriations for construction	$33,192.61	$31,167.61
L 3.	Bonds outstanding	76,000.00	......
L 3a.	Bonds	......	76,000.00
L 3b.	Appropriations for bond payment	......	38,000.00
L 4.	Notes payable	9,000.00	15,000.00
L 5, 6, 7.		......	......
L 8.	Interest due but not paid	271.67	......
L 9.	Interest accrued but not due	......	271.67
L 10 and 11.		......	......
L 11a.	Appropriations for note payments	6,000.00	......
L 11b.	Appropriations for bond payments	38,000.00	......
L 12.	Other funds (giving particulars)	......	......
L 13.	Other liabilities	......	......
L 14.	Total	$162,464.28	$160,739.28

M—RECEIPTS.

M 1. For year ending June 30th, 1906.

			A.	P.
M 2.	Private arc lights unmetered		$3,260.62	$3,260.62
M 3.	Private incandescent unmetered		133.20	133.20
M 4	Private lighting, metered, domestic and commercial arc and incandescent		13,514.34	......
	Commercial	$9,815.44		
	Domestic	3,698.90		
			......	13,514.34
M 5.	Public arc lights		......	......
M 5a.	Public arc lights, at $75 per lamp		....	14,200.00
M 6.	Public incandescent lights in buildings		2,637.04	......

			A.	P.
M 6a.	Public incandescent lights		......	$2,637.04
M 7.	Public power		......	......
M 8.	Commercial power		......	1,687.34
M 9.	Electric power		$1,687.34	......
M 10.	Sale of current other than noted		......	......
M 11.	Rents of meters		......	......
M 12.	Rent of motors, fixtures and appliances		......	......
M 13.	Net profits from sale of fixtures and appliances		......	......
M 14.	Other receipts; steam furnished		1,360.12	1,360.12
M 15.	Other receipts; city arc lamps		14,200.00	......
M 16.	Total		$36,792.66	$36,792.66

N—EXPENSES.

			A.	P.
N 1.	For year ending June 30th, 1906.			
	Production—			
N 2.	Fuel		$11,777.43	$11,777.43
N 3.	Oil and waste		673.18	673.18
N 4.	Water for boilers		858.45	858.45
N 5.	Water power or water rights		......	......
N 6.	Wages and salaries at station		5,040.76	5,040.76
N 7.	Maintenance, repairs and renewals—			
	(a) Buildings; station	$7.20		
	(b) Steam plant	1,225.61		
	(c)	......		
	(d) Electric plant	579.59		
			1,812.40	1,812.40
N 8, 9.			......	......
N 10.	Total production		$20,162.22	$20,162.22
	Distribution—			
N 11.	Wages and salaries (a, b, c)		$2,338.85	$2,338.85
N 12.	Expenses beyond the meter:			
	Carbons	$850.84		
	Lamps	682.13		
	Globes	153.64		
			......	1,686.61
N 13.	Supplies, tools and appliances		1,870.19	......
N 14.	Maintenance, repairs and removals			1,802.82
	(a), (b), (c)	......		
	(d) Meters, lamps and lines	$1,802.82		
	(e) Services	......		

		A.	P.
(f) and (h) Commercial arc lamps and globes; public street lamps.	$153.61		
(g) and (i) Commercial incandescent lamps; public incandescent lamps.....	682.13		
		$2,638.59	
N 15. Miscellaneous, carbons.......		850.84	......
N 15a. Miscellaneous		......	$1,870.19
N 16. Total		$7,698.48	$7,698.48
General—			
N 17 and 18.		......	......
N 19. General office salaries.......		$1,200.00	$1,200.00
N 20. Rent of office...............		......	......
N 21. Office expenses		118.95	118.95
N 22. Legal expenses		......	......
N 23. Injuries, damages and claims.		......	......
N 24. Licenses and royalties......		......	......
N 25. Insurance, fire, boiler, accident		150.00	......
N 25a. Insurance, boiler		......	150.00
N 26. Bad debts		13.39	......
N 27 and 28 (a) and (b).		......	......
N 29. Other general expenses, incidentals		10.00	10.00
N 30. Total general expense.......		$1,492.34	$1,478.95
N 31. Total expenses		$29,353.03	$29,339.61
Resume—			
Total receipts		$36,792.66	$36,792.66
Total expenses		29,353.03	29,339.61
Balance to profit and loss.		$7,439.63	$7,453.02

O—Profit and Loss.[1]

		A.	P.
O 1. For year ending June 30th, 1906.			
Credit—			
O 2. By balance from last year, if any		......	......
O 3. By balance of receipts........		$7,439.63	$7,453.02
O 4. Appropriation for maintenance		29,100.00	30,825.00

---

[1] As there is nothing in this report to show how any balance of the previous year was reached, the statement of any such balance appears to be more confusing than instructive, and it is therefore omitted in the case of each municipal plant. Reason for this omission is found in the fact that the law requires depreciation on the costs of municipal plants to be computed at a certain rate, and that no credit for street lighting is made in some of these plants.—A.

		A.	P.
O 4a.	By interest on loans or deposits	......	$3,105.00
O 5.	Appropriation for interest....	$3,105.00	......
O 6.	By depreciation fund (Appropriation for.—A.)........	7,025.00	7,025.00
O 7.	By balance (if deficit).......	3,336.19	24,103.33
O 8.	Total	$50,005.82	$73,103.35
	Debit—		
O 9.	To balance from last year, if any	......	$23,084.14
O 10 and 11.	To interest on bonds and notes	$3,383.76	3,112.09
O 12.	To taxes	......	......
O 12a.	Amount paid city collector...	39,532.51	39,532.51
O 13.	To compensation for franchise	......	......
O 14.	To dividends on stock........	......	......
O 15.	To depreciation	7,025.00	......
O 15a.	To depreciation fund........	......	7,025.00
O 16.	To sinking fund............	......	......
O 17.	To reserve fund............	......	......
O 18.	To other funds (giving particulars)	......	......
O 19.	To extensions and construction	......	......
O 20.	To bad debts...............	64.55	77.94
O 20a.	To other purposes, accrued interest	......	271.67
O 21.	To balance, if surplus.......	......	......
O 22.	Total	$50,005.82	$73,103.35

Danvers.

K—Assets.

K 1. As of date, end of last fiscal year, June 30th, 1906.

		A.	P.
K 2.	Cash on hand..............	$3,910.77	$6,410.77
K 3.	Other accounts receivable....	44.54	44.54
K 4.	Due for electric light and power	631.54	631.54
K 5	and 6....................	......	......
K 6a.	Value of insurance policy....	......	233.67
K 7.	Office furniture	76.00	76.00
K 8.	Land (a, b)...............	......	......
K 9.	Buildings and land.........	......	9,742.25
K 9a.	Real estate	12,004.47	......
K 10.	Steam plant	24,101.39	18,880.96
K 11.	Water power plant.........	......	......
K 12.	Electric plant	11,479.31	7,423.33
K 13.	Lines (overhead)	20,122.12	......
K 13a.	Lines	......	13,425.08

		A.	P.
K 14.	Transformers	$5,793.57	$4,478.00
K 15.	Meters	8,466.41	6,637.64
K 16.	Services. (Included with lines.—A).		
K 17.	Lamps and globes	7,152.01	......
K 17a.	Lamps	......	4,499.19
K 18.	Repairs to steam plant	153.95	......
K 19.	Fuel on hand	216.80	216.80
K 20.	Carbons on hand	23.05	23.05
K 21.	Insurance	233.67	......
K 22.	Incandescent lamps on hand	52.80	52.80
K 23.	Globes and other fixtures on hand	......	19.58
K 23a.	Globes	19.58	......
K 24.	Motors on hand	......	......
K 25.	Miscellaneous supplies on hand (tools and appliances)	809.24	809.24
K 25a.	Oil and waste	26.83	26.83
K 26.	Sinking fund	7,030.50	7,030.50
			$80,653.77
	Less depreciation as per vote of town (K 9 to K 17)	......	2,981.25
			$77,672.52
K 27.	Other assets:		
	(a) Repairs on electric plant	$938.05	938.05
	(b) Repairs on lines and lamps	532.06	532.06
K 28.	Other capital assets:		
	Repairs on steam plant	......	153.95
K 29.	Total assets	$103,009.42	$79,296.58

K 30. Do the values above given represent the original cost of the present assets, their present market value, or cost of duplication? See answer to K 30 for Chicopee.—A. Original cost of plant, less depreciation as shown by books.—P.

Real estate	$12,001.47
Steam plant	24,101.39
Electric plant	11,479.31
Lines	20,122.12
Lamps and globes	7,152.01
Transformers	5,793.57
Meters	8,466.41
Total cost	$89,119.28
Total assets	$79,296.58
Profit and loss	11,621.43
Balance	$90,918.01

L—LIABILITIES.

		A.	P.
L 1.	As of date, end of last fiscal year, June 30, 1906.		
L 2.	Appropriations for construction	$7,916.87	$7,916.87
L 3.	Bonds outstanding	49,400.00	49,400.00
L 4.	Notes payable	5,500.00	5,500.00
L 5, 6, 7, 8.		......	......
L 9.	Interest accrued but not due.	394.00	394.00
L 10.	Appropriation for sinkingfund	11,377.04	11,377.04
L 11.	Depreciation fund	......	......
L 12.	Appropriations for extraordiary repairs	1,330.10	1,330.10
L 13.	Appropriation for bond payments	15,000.00	15,000.00
L 14.	Total	$90,918.01	$90,918.01

M—RECEIPTS.[1]

		A.	P.
M 1.	For year ending June 30, 1906.		
M 2, 3		......	......
M 4.	Private lighting metered	$11,600.48	
	Domestic $5,996.96		
	Commercial 5,603.52		
			$11,600.48
M 5.	Public arc lights	......	......
M 6.	Public incandescent lights (in buildings. A.)	366.49	366.49
M 7.	Public power	......	......
M 8.	Commercial power	......	3,794.83
M 9.	Electric power	3,794.83	......
M 10-15.	————		
M 16.	Total	$15,761.80	$15,761.80
	Balance to profit and loss..		1,940.24
			$17,702.04

N—EXPENSES.

		A.	P.
N 1.	For year ending June 30, 1906.		
	Production—		
N 2.	Fuel	$6,461.82	$6,461.82
N 3.	Oil and waste	164.72	164.72
N 4.	Water for boilers	233.23	233.23
N 5.	Water power or water rights..	......	......
N 6.	Wages and salaries (at station.—A.)	3,825.16	3,825.16
N 7.	Maintenance, repairs and renewals	1,320.43	1,320.43

---

[1] These receipts contain nothing for the value of light in public buildings and of street lighting.—A.

			A.	P.
	(a) Buildings (station.—A.)	$55.92		
	(b) Steam plant	471.33		
	(c) ———	....		
	(d) Electric plant	793.18		
N 8.	General expense (of production.—P.)		......	$107.30
N 9.	Station tools, appliances and incidentals		$107.30	......
N 10.	Total production		$12,112.66	$12,112.66
	Distribution—			
N 11.	Wages and salaries (a, b, c)		$986.15	$986.15
N 12.	Expense beyond meter		......	......
N 13.	Supplies, tools and appliances		137.84	137.84
N 14.	Maintenance, repairs, removals:			
	(a, b, c) ———			
	(d) Meters, lamps and lines	$1,643.05		1,643.05
	(e) Carbons	......		196.54
	(f) Commercial arc lamps and globes	77.14		77.14
	(h) (Public street, etc., lamps.)			
	(g) Commercial incandescent lamps	25.35		......
	(i) (Public incandescent lamps.)			
	(i) Public incandescent lamps	......		25.35
			1,745.54	......
N 15.	Miscellaneous. Carbons		196.54	......
N 16.	Total distribution		$3,066.07	$3,066.07
	General—			
N 17.	Directors' allowance		......	......
N 18.	Salaries of officers, committee, and commissioners		150.00	150.00
N 19.	General office salaries		1,524.72	1,524.72
N 20.	Rent of office		......	......
N 21.	Office expenses		167.44	167.44
N 22-24.	———			
N 25.	Insurance, fire, boiler, accident		641.72	641.72
N 26.	Bad debts		39.43	39.43
N 27-29.	———			
N 30.	Total general expenses		*$2,523.31	$2,523.31
N 31.	Total expenses		$17,702.04	$17,702.04

*On original this is $2,183.88, which would make the total expense, N 31, $17,362.61.—J. H. G.

Resume—	A.	P.
Total receipts	$15,761.80	$15,761.80
Total expenses	17,702.04	17,702.04
Balance to profit and loss	1,940.24	1,940.24

O—PROFIT AND LOSS.

			A.	P.
O	1.	For year ending June 30, 1906.		
O	2.	Estimated value of street lighting	$6,101.69	......
O	3.	By appropriation for maintenance (1905.—P.)	5,647.50	5,647.50
O	4.	Incidentals	1.00	......
O	4a.	Depreciation account from tax levy	......	2,500.00
O	5.	From sinking fund	213.57	213.57
O	6.	By other items (summonses. —A.)	25	1.25
O	7.	By balance (if deficit)	......	11,621.43
O	8.	Total	$11,964.01	$19,983.75
		Debit—		
O	9.	To balance from last year, if any	Note (1)	$9,864.13
O	10.	To interest on bonds	1,717.62	1,717.62
O	11.	To interest on notes, loans and deposits	55.33	55.33
O	12-14.	————		
O	15.	To depreciation and charged off	3,425.18	......
O	15a.	To depreciation fund	......	6,406.43
O	16-19.	————		
O	20.	To other purposes, balance (manufacturing.—P.) account	1,940.24	1,940.24
O	21.	To balance (if surplus)	4,825.64	......
O	22.	Total	$11,964.01	$19,983.75

Holyoke.[2]

K—ASSETS.

			A.	P.
K	1.	As of date (end of last fiscal year) June 30, 1906.		
K	2.	Cash on hand	$6,717.73	$6,717.73
K	3.	Notes receivable	......	......
K	4.	Sundry accounts due:		
		(a) Due for electric light and power (including $3,907.19 due from city elec.—P.)	13,394.09	13,394.09

---

[1] See note at Profit and Loss statement for Chicopee.

[2] At Holyoke, the general cash in hands of city treasurer, and also the depreciation fund apply to an undetermined extent to the gas as well as to the electric business.—A.

			A.	P.
	(b) Gas (including $191.38 due from city gas)			$10,646.29
	(c) Jobbing			2,578.13
K 5-6.	————			
K 7.	Office furniture		$2,100.00	2,100.00
K 8-9.	Real estate		130,230.65	......
	(a) Gas			173,338.21
	(b) Electricity			107,956.30
K 10.	Steam plant		97,204.83	83,248.89
K 11.	Water power plant		20,803.53	17,233.91
K 12.	Electric plant		167,331.21	......
K 12a.	Gas and electric plant:			
	(a) Electric	$141,112.64		
	(b) Gas	143,853.40		
				284,966.04
K 13.	Lines overhead		65,567.07	......
K 13a.				
	(a) Electric lines	56,280.32		
	(b) Gas mains	150,394.80		
				206,675.12
K 14.	Transformers		15,873.72	14,304.88
K 15.	Meters		16,143.95	
K 15a.	Meters:			
	(a) Gas	59,357.75		
	(b) Electricity	14,278.04		
				73,635.79
K 16.	Services (Included with lines.—A.)		......	......
K 17.	Lamps and globes		$25,756.20	......
K 17a.	Arc lamps		......	$21,809.37
K 18.	......		......	......
K 19.	Fuel on hand		1,738.80	......
K 19a.	Fuel on hand—			
	(a) Gas	$7,148.53		
	(b) Electricity	1,738.80		
			......	8,887.33
K 20.	Carbons on hand		280.00	280.00
K 21.	Arc lamps on hand		......	......
K 22.	Incandescent lamps on hand		243.23	243.23
K 23.	Globes and other electric fixtures on hand—			
	(a) Globes	$65.81	65.81	......
	(b) Gas	1,258.62		
			......	1,324.43
K 24.	Motors on hand		......	......
K 24a.	Tools and appliances		1,845.27	......
K 25.	Miscellaneous supplies on hand			
	(a) Oil and waste	$74.15	74.15	......
	(b) Tar	2,705.20		
	(c) Coke	1,841.40		

			A.	P.
	(d) Purifying material	$84.00		
	(e) Gas oil	404.03		
	(f) Tools—gas	2,174.03		
	(g) " —electricity	1,845.27		
	(h) Horses and wagons	2,441.00		
			......	$11,569.08
K 26.	Depreciation funds in hands of city treasurer		$36,248.44	36,248.44
K 27.	......		......	......
K 28.	Other capital assets— (a) Horses and wagons (Both gas and electric.—A.)		2,441.00	......
K 29.	Total assets		$604,059.98	$1,077,157.26
	Profit and loss balance			$90,564.30

K 30. Do the values above given represent the original cost of the present assets, their present market value, or cost of depreciation? Values given for water power, plant, real estate, steam plant, electric plant, lines, transformers, meters and arc lamps represent the total sums charged as costs of these items since the municipal plant was started, and the values of other items are taken from the statements of assets made by the municipality, all as contained in the report to the gas and electric light commissioners, dated June 30, 1906. Value of the gas assets on the same basis as above was $643,653.73.—A. Original cost, less depreciation.—P.

L—LIABILITIES.

L 1. As of date, end of last fiscal year, June 30th, 1906.

			A.	P.
L 2.	Appropriations for construction		$28,595.41	$28,595.41
L 3.	Bonds outstanding		802,800.00	802,800.00
L 4.	Bills for construction		6,509.33	6,509.33
L 5.	Bills for maintenance		18,603.93	18,603.93
L 6-7.	......		......	......
L 8.	Interest accrued, but not due.		3,334.33	3,334.33
L 9.	Overdrafts for construction		90,695.71	......
L 10.	Maintenance appropriation used for construction—			
	(1) Gas	$42,658.63		
	(2) Electricity	48,037.08		
			......	90,695.71
L 11.	Depreciation fund		......	......
L 12.	Loan account		82,382.87	82,382.87
L 13.	Appropriations for bond payments		134,800.00	134,800.00
L 14.	Total liabilities*		$1,167,721.58	$1,167,721.58

---

* The liabilities apply to both the gas and the electric plants in undetermined proportions.—A.

M—Receipts.

M 1.	For year ending June 30th, 1906.	A.	P.
M 2.	Private arc lights unmetered.	$240.52	$240.52
M 3.	Private incandescent lights, unmetered	1,857.56	1,857.56
M 4.	Private lighting, metered....	46,235.10	46,235.10
M 5.	Public arc lights...........	......	41,753.92
M 6.	Public incandescent lights (in buildings.—A.)	5,689.26	927.30
M 7.	Public power...............	......	......
M 8.	Commercial power—		
	(a) Electricity.$29,949.24		
	(b) Gas 144,611.01	......	174,560.25
M 9.	Electric power..............	29,949.24	......
M 10.	Sale of current other than noted. (1) Public buildings—		
	(a) Electricity..$5,689.26		
	(b) Gas 2,245.72	......	7,954.98
M 11.	Rents of meters (gas).......	......	14.50
M 12, 13, 14.	....	......	......
M 15.	Street arc and street incandescent	42,681.22	......
M 15a.	Other receipts—		
	(a) Coke $9,532.64		
	(b) Tar 2,273.72	......	11,806.36
M 16.	Total	$126,652.90	$285,330.49

N—Expenses.

N 1.	For year ending June 30, 1906.		
Production.			
N 2.	Fuel	$6,794.70	......
	(a) Electric coal.$6,794.70		
	(b) Gas coal....42,342.57		
	(c) Gas oil..... 9,379.51		
	(d) Gas purifier. 689.65	......	59,206.43
N 3.	Oil and waste..............	268.00	268.00
N 4.	Water for boilers...........	78.37	......
	(a) Electric $78.37		
	(b) Gas 181.10	......	259.47
N 5.	Water power or water rights—		
	(a) Gas $747.75		
	(b) Electric 22,053.66	......	22,801.41

				A.	P.
N	5a.	Water power rent		$22,053.66	......
N	6.	Wages and salaries at station		12,791.59	......
N	6a.	Wages and salaries—			
		(a) Gas	$23,677.63		
		(b) Electric	12,791.59		
				......	$36,469.22
N	7.	Maintenance, repairs and renewals—			
		(a) Buildings (station.—A.)	$1,818.36		$1,818.36
		(1) Gas	......		6,551.41
		(b) Steam plant	3,434.47		3,434.47
		(c) Water power plant	524.06		524.00
		(d) Electric	585.91		585.91
		(e) Tools and appliances—			
		(1) Gas	......		1,290.05
		(2) Electric	......		115.27
				$6,362.74	
N	8.	Gen'l expenses, station tools, appliances and incidentals		115.27	......
N	9.	Current purchased		......	......
N	10.	Total production		$48,464.33	$133,324.00
Distribution.					
N	11.	Wages and salaries (a) (b) (c)		$6,755.74	......
		(a) Electric	$6,755.74		
		(b) Gas	2,691.28		
				......	$9,447.02
N	12.	Expense beyond meter—			
		(a) Carbons	$852.31		
		(b) Incandescent	1,462.46		
		(c) Globes	341.85		
				......	2,656.62
N	13.	Supplies, tools, appliances		120.42	......
		(a) Gas	$644.18		
		(b) Electric	120.42		
				......	764.60
N	14.	Maintenance, repairs and removals		4,177.82	
		(a) Gas mains	......		2,719.86
		(b) Electric lines	......		1,859.86
		(c) Meters, lamps lines	$1,859.86		......
		(d) Gas meters	......		1,661.98
		(e) Horses, wagons,			
		(1) Electric	513.65		513.65
		(2) Gas	......		175.00

		A.	P.
(f) Commercial arc lamps, globes....	$341.85		......
(g) Public incandescent lamps...	1,462.46		......
			......
N 15. Carbons		$852.31	......
N 16. Total		$11,906.29	$19,798.59
General.			
N 17, 18.		......	......
N 19. General office salaries........		$5,677.95	......
(a) Electric ...	$5,677.95		
(b) Gas	5,184.82		
		......	$10,862.77
N 20.		......	......
N 21. Office expenses.............		1,432.67	......
(a) Electric ...	$1,432.67		
(b) Gas	1,615.57		
		......	3,048.24
N 22. Legal expenses—			
(a) Electric ...	$332.75	332.75	......
(b) Gas	375.23		
		......	707.98
N 23, 24.		......	......
N 25. Insurance, fire, boiler, accident.		829.23	......
(a) Electric ...	$829.23		
(b) Gas	780.52		
		......	1,609.75
N 26. Bad debts..................		166.75	......
(a) Electric ...	$166.75		
(b) Gas	153.37		
		......	320.12
N 27, 28, 29.		......	......
N 30. Total general expenses......		$8,439.35	$16,548.86
N 31. Total expenses..............		$68,809.97	$169,671.45
Resume.			
Total receipts....................		$126,652.90	$285,330.49
Total expenses....................		68,809.97	169,671.45
Balance to profit and loss.....		$57,842.93	$115,659.04

O—PROFIT AND LOSS.

(In this profit and loss account the items of interest, bond premiums, appropriations, depreciation fund, money paid to city treasurer, apply to an undetermined extent to the municipal gas plant as well as to the electric plant.—A.)

	A.	P.
Credit.		
O 1. For year ending June 30, 1906.		
Appropriation for maintenance	$62,517.53	$62,517.53
Appropriation for interest....	28,379.57	28,379.57

		A.	P.
O 2.	By balance from last year, if any	......	$18,029.53
O 3.	By balance of receipts	$57,842.93	......
	(a) Electric ..$57,842.93		
	(b) Gas 57,816.11		
		......	115,659.04
O 4.	By interest received (on bonds.—P.)	20.42	20.42
O 5.	By income from bond premiums	29.10	29.10
O 6.	By appropriation for depreciation fund	55,196.00	......
O 6a.	By other items, depreciation fund	......	55,196.00
O 7.	By balance—if deficit	136,923.59	90,564.32
O 8.	Total	$340,909.14	$370,395.51
Debit.			
O 9.	To balance from last year, if any	......	......
O 10.	To interest on bonds (paid and accrued.—A.)	$30,140.83	$30,140.83
O 11, 12		......	......
O 12a.	Money paid to city treasurer	284,821.36	......
O 13		......	......
O 14.	Money collected and returned to city treasurer	......	284,821.36
O 15.	To depreciation charged off	25,932.43	......
O 15a.	To depreciation fund—		
	(a) Gas $29,263.57		
	(b) Electric .. 25,932.43		
		......	55,196.00
O 16.	To sinking fund	......	......
O 17.	To bad debts (prior to June 30, 1905.—A.)	14.52	14.52
O 18, 19		......	......
O 20.	To bad debts—		
	(a) Gas $222.78		
	(b) Electricity . 14.54		
		......	237.32
O 21		......	......
O 22.	Total	$340,909.14	$370,395.51

Marblehead.

K—ASSETS.

K 1. As of date, end of last fiscal year, June 30, 1906.

		A.	P.
K 2.	Cash on hand	$16,584.73	$18,090.89
K 3.	Depreciation cash	3,006.16	......
K 4.	Due for electric light and power	2,522.60	......

		A.	P.
K 4a.	Sundry accounts due	......	$2,522.60
K 5.	Investments	......	......
K 6.	Horses and wagons	......	696.75
K 7.	Office furniture	......	......
K 8.	and 9. Land and buildings (real estate.—A.)	$37,791.85	24,755.21
K 10.	Steam plant	23,686.18	12,591.63
K 11.	Water power plant	......	......
K 12.	Electric plant	13,753.61	8,500.13
K 13.	Lines overhead and under ground	30,765.65	18,075.31
K 14.	Transformers	8,471.51	6,152.81
K 15.	Meters	9,857.58	6,484.83
K 16.	Services. (Included with lines. —A.)		
K 17.	Lamps and globes	3,730.02	......
K 17a.	Lamps	......	1,203.03
K 18.	Other permanent works	......	......
K 19.	Fuel on hand	69.70	69.70
K 20.	Carbons on hand	210.60	210.60
K 21.	Oil and waste	32.16	32.16
K 22.	Incandescent lamps on hand	......	258.98
	Nernst	259.98	......
K 23.	Globes	15.00	......
K 23a.	Globes and other electric fixtures on hand	......	15.00
K 24.	Tools and appliances	......	15.00
K 25.	Electric fixtures on hand	167.43	......
K 26.	Sinking fund	13,012.56	13,012.56
K 27.	Other current assets	......	......
K 28.	Other capital assets	......	......
	Horses and wagons	695.44	......
K 29.	Total assets	$163,132.76	$112,915.42

K 30. Do the values above given represent the original cost of the present assets, their present market value, or cost of duplication? See answer to K 30 for Chicopee.—A. Original cost, less depreciation.—P.

Balance to profit and loss, $24,302.40.—P.

COST OF PLANT AS PER BOOKS.—P.

R. E.	$37,791.85
S. P.	23,686.18
E. P.	13,753.61
Lines	30,765.65
L. and globes	3,730.02
Transformers	8,471.51
Meters	9,857.58
	$128,056.40
Charged during year...	$3,934.11

L—Liabilities.

			A.	P.
L 1.	As of date, end of last fiscal year, June 30, 1906.			
L 2.	Appropriation for construction		$51,717.82	$51,717.82
L 3.	Bonds		......	50,000.00
	Outstanding		50,000.00	......
L 4.	Overdraft for construction....		1,065.27	......
L 4a.	Appropriation for notes......		23,500.00	23,500.00
L 5, 6, 7, 8, 9, 10	....		......	......
L 11.	Appropriation for sinking fund		12,000.00	12,000.00
L 12.	Other liabilities.............		......	......
L 13.	Total		$138,283.09	$137,217.82

M—Receipts.[1]

			A.	P.
M 1.	For year ending June 30, 1906.			
M 2.	Private arc lights unmetered..		......	......
M 3.	Private incandescent unmetered		......	......
M 4.	Private lighting metered and domestic		$17,067.13	......
M 4a.	Private lighting metered—	$4,554.38		
	Discount...	187.14		
		$4,367.24		
	Commercial, $13,019.09 Discount, 319.20	12,699.89		
				$17,067.13
M 5, 6, 7, 8, 9, 10	....		......	......
M 11.	Rents of meters...........		574.30	574.30
M 12, 13, 14, 15	....		......	......
M 16.	Total		$17,641.43	$17,641.43
	Furnished public buildings...............			$1,927.51

N—Expenses.

		A.	P.
N 1.	For year ending June 30, 1906.		
Production.			
N 2.	Fuel	$5,033.73	$5,033.73
N 3.	Oil and waste..............	378.32	378.32
N 4.	Water for boilers...........	No water charged.	
	Value of town water used....	......	375.00
N 5.	Water power or water rights..	......	......
N 6.	Wages and salaries..........	......	3,088.99
	At station..................	3,088.99	......

---

[1] These receipts contain nothing for lighting streets or public buildings.—A.

	A.	P.
N 7. Maintenance, repairs and renewals—		
(a) Buildings (station.—A.) $47.50	$47.50	
(b) Steam plant......368.67	368.67	
(c) Water power plant	......	
(d) Electric plant....259.74	259.74	
	......	$675.91
N 8, 9........................	......	......
N 10. Total production............	$9,176.95	$9,176.95
Distribution.		
N 11. Wages and salaries (a), (b), (c)	$2,696.50	$2,696.50
N 12. Expenses beyond meter......	......	......
N 13. Supplies, tools and appliances	612.91	612.91
N 14. Maintenance, repairs and removals—		
(a) Meters, lamps and lines..	362.77	362.77
(b) Commercial incandescent lamps	83.15	......
(c) Public incandescent lamps	20.57	83.15
(d) Carbons	588.87	588.87
(e) Globes	......	20.57
N 15. ————		
N 16. Total	$4,364.77	$4,364.77
General.		
N 17 and 18......................	......	......
N 19. General office salaries.......	$882.00	$882.00
N 20. Rent of offices..............	......	......
N 21. Office expenses.............	1,356.17	1,356.17
N 22, 23, 24......................	......	......
N 25. Insurance; fire, boiler accident	677.00	677.00
N 26, 27, 28, 29.................	......	......
N 30. Total general expenses.......	$2,915.17	$2,915.17
N 31. Total expenses	$16,456.89	$16,456.89
Resume.		
Total receipts..............	$17,641.43	$17,641.43
Total expenses	16,456.89	16,456.89
Balance to profit and loss..	$1,184.54	$1,184.54

O—PROFIT AND LOSS.

O 1. For year ending June 30, 1906.		
Credit.		
O 2. Public lighting in buildings per meters	$1,927.51	......
O 3. By depreciation fund........	......	$4,375.00
O 4. By balance of receipts.......	$1,184.54	1,184.54

			A.	P.
O 5.	Appropriations		[3]$25,875.00	......
O 5a.	By appropriation for interest on loan		......	$2,000.00
O 6.	By income from sinking fund		342.55	342.55
O 7.	By other items, appropriations for maintenance		......	19,500.00
O 8.	By balance, if deficit		......	24,302.40
O 9.	Overdraft for construction exceeding appropriation		......	[2]1,065.27
O 9a.	Estimated value of street lighting		$9,259.06	......
O 10.	Total		$38,588.66	$52,769.76
Debit.				
O 11.	To balance from last year, if any		Note (1)	$28,440.13
O 12.	To interest on bonds		2,000.00	2,000.00
O 13.	To interest on notes, loans and deposits (notes.—A.)		43.75	43.75
O 14.	To depreciation		......	4,090.34
O 15.	To compensation for franchises		......	......
O 16.	To town treasurer, appropriation from receipts		......	1,500.00
O 17.	To town treasurer, balance of receipts		......	15,512.18
O 18.	To depreciation charged off		4,375.00	......
O 19.	To discounts for bad debts		......	118.09
O 20.	To overdrafts for construction		......	[2]1,065.27
O 21.	To other items—			
	(a) Town treasurer, balance of acct.	15,512.18		
	(b) Discount for bad debts	118.09		
	(c) Overdraft from construction for maintenance	1,065.27		
			16,695.54	
O 21a.	Surplus balance		15,474.37	
O 22.	Total		$38,588.66	$52,769.76

---

[1] See note on Chicopee Profit and Loss.

[2] Both debit and credit........ $1,065.27—P.

[3] Appropriation for maintenance made since June 30, 1905........ $19,500.00

Appropriation for interest........ 2,000.00

Appropriation for insurance........ ....

Appropriation for depreciation fund........ 4,375.00—A.

Detail of Depreciation.—P.

Land and Buildings....	$1,303.58
S. P..................	767.98
E. P..................	446.69
S. Lines..............	820.25
A. and L..............	63.31
Incandescent street lamps	3.86
Transformers	287.26
Meters	376.65
Distribution T. and appliances	13.18
Station tools..........	7.58
	$4,090.34

North Attleboro.

K—Assets.

K 1. As of date, end of last fiscal year, June 30, 1906.

			A.	P.
K 2.	Cash on hand..............		$7,628.19	$10,316.19
K 3.	Other accounts..............		5.11	......
K 4.	Sundry accounts due........		......	722.93
	Due for electric light and power		717.82	......
K 5 and 6.	....		......	......
K 7.	Office furniture............		125.52	125.52
K 8 and 9.	Land and buildings....		......	8,397.92
	Real estate................		13,415.51	......
K 10.	Steam plant................		26,841.18	17,302.35
K 11.	Water power plant..........		......	......
K 12.	Electric plant..............		10,734.79	6,758.96
K 13.	Lines (a), (b).............		......	15,986.81
	Overhead		24,678.96	......
K 14.	Transformers		7,669.64	5,440.28
K 15.	Meters		6,154.51	4,450.12
K 16.	Services. (Included with lines. —A.)			
K 17.	Lamps and globes...........		550.82	......
K 17a.	Lamps, incandescent, street	$186.92		
	Arcs	87.13	......	274.05
K 18, 19.	....		......	......
K 20.	Carbons on hand............		11.70	11.70
K 21	Arc lights on hand..........		......	......
K 22.	Incandescent lamps on hand..		203.56	203.56
K 23.	Globes and other electric fixtures on hand		11.15	
K 23a.	Globes and other electric fixtures	$11.15		
	on hand	703.72		714.87

		A.	P.
K 24.	Depreciation fund...........	$2,688.00	......
K 25.	Miscellaneous supplies on hand, electric materials.........	703.72	......
K 25a.	Tools and appliances........	598.91	$598.91
K 26.	Sinking fund...............	12,232.98	12,232.98
K 27, 28	....	......	......
K 29.	Total assets................	$114,972.07	$83,537.15
	Profit and loss balance..................		17,794.40
			$101,331.55

K 30. Do the values above given represent the original cost of the present assets, their present market value, or cost of duplication? See answer to K 30 for Chicopee.

Cost as per books:—P.

Real estate	$13,415.51
S. P.	26,841.18
E. P.	10,734.79
Lines	24,678.96
Lamps and gloves......	550.82
Transformers	7,669.64
Meters	6,154.51
	$90,045.41
Charged during year...	$2,732.75

L—LIABILITIES.

		A.	P.
L 1.	As of date, end of last fiscal year, June 30, 1906.		
L 2.	Appropriations for construction	$23,145.40	$23,145.50
L 3.	Bonds (outstanding.—A.) ...	50.000.00	50.000.00
L 4.	Notes payable	12,035.00	12,035.00
L 5.	Unpaid bills (for maintenance.—A.)	246.77	246.77
L 6.	Appropriation for note payments	4,865.00	4,865.00
L 7.	Appropriation for sinking fund	11,000.00	11,000.00
L 8.	Interest accrued, but not due.	39.38	39.38
L 9, 10, 11, 12, 13.	————		
L 14.	Total	$101,331.55	$101,331.55

M—RECEIPTS.

		A.	P.
M 1.	For year ending June 30, 1906.		
M 2.	Private lighting metered....	$15,087.79	$15,087.79
M 3.	Public incandescent lights...		(?)309.55
	In buildings..............	309.55	
M 3a.	Appropriation for street lighting	6,000.00	......
M 4.	Total	$21,397.34	$15,087.79

N—EXPENSES.

			A.	P.
N 1.	For year ending June 30, 1906.			
N 2.	Fuel		$5,391.87	$5,391.87
N 3.	Oil and waste		139.08	139.08
N 4.	Water for boilers		75.00	75.00
N 5.	Water power or water rights		......	......
N 6.	Wages and salaries			2,412.57
	At station		2,412.57	
N 7.	Maintenance, repairs and renewals		365.69	365.69
	(a) Buildings (station.—A.)	$17,67		
	(b) Steam plant	284.37		
	(c) Electric plant	63.65		
N 8.	General expense		......	66.67
N 9.	Tools, appliances and incidentals		66.67	......
N 10.	Total production		$8,450.88	$8,450.88
	Distribution—			
N 11.	Wages and salaries (a), (b), (c)		$37.39	$37.39
N 12.	Maintenance, repairs and removals:			
	(a) Meters and lamps	$503.50		503.50
	(b) Commercial arc lamps and globes	1.34		......
	(c) Public (street, etc.) lamps and globes	......		1.34
			504.84	
N 13.	Total		$542.23	$542.23
	General—			
N 14.	Salaries of officers, committee, commissioners		$225.00	$225.00
N 15.	General office salaries		1,350.07	1,350.07
N 16.	Office expenses		163.59	163.59
N 17.	Insurance: fire, boiler and accident		359.60	359.60
N 18.	Bad debts		16.18	16.18
N 19.	Total general expenses		$2,114.44	$2,114.44
N 20.	Total expenses		$11,107.55	$11,107.55
	Revenue—			
	Total receipts		$21,397.34	$15,397.34
	Total expenses		11,107.55	11,107.55
	Balance to profit and loss		$10,289.79	$4,289.79

O—PROFIT AND LOSS.

		A.	P.
O 1.	For year ending June 30, 1906.		
	Credit—		
O 2.	By balance of receipts.......	$10,289.79	$4,289.79
O 3.	By appropriation for street lighting	......	6,000.00
O 4.	By income from sinking fund	473.15	473.15
O 5.	Appropriation for depreciation (cash.—A.)	2,688.00	2,688.00
O 6.	By balance, if deficit.......	......	17,794.40
O 7.	Total	$13,450.94	$31,245.34
	Debit—		
O 8.	To balance from last year, if any	Note (1)	$21,548.84
O 9.	To interest on bonds........	2,000.00	2,000.00
O 10.	To interest on notes.........	445.55	445.55
O 11.	Depreciation charged off..... (Depreciation fund.—P.)	3,084.76	3,084.76
O 12.	To other purposes..........	4,166.19[2]	......
O 13.	Appropriations for note payments	......	695.00
O 14.	Appropriation for bond payment	......	1,000.00
O 15.	Interest on notes purchased..	......	47.00
O 16.	To portion of premium written off	......	23.29
O 17.	Interest not used and returned to town treasurer.........	......	18.15
O 18.	To extensions and new constructions	......	2,382.75
O 18a.	Surplus balance.............	3,754.44	......
O 19.	Total	$13,450.94	$31,245.34

Peabody.

K—ASSETS.

K 1.	As of date end of last fiscal year, June 30, 1906.		
K 2.	Cash on hand..............	$7,408.06	$12,568.45
K 3.	Depreciation fund	5,160.39	......

---

[1] See note on Chicopee Profit and Loss.

[2] The receipts of plant used for and charged to construction account $2,382.75

The receipts of plant used for and charged to construction account	$2,382.75
Maintenance, appropriation used for note.................	695.00
Maintenance, appropriation used for bonds...............	1,000.00
Interest on notes purchased............................	47.00
Portion of premium written off..........................	23.29
Interest not used and unavailable.......................	18.15

		A.	P.
K 4. Sundry accounts due (electric light and power.—A.)		$1,082.82	$1,082.82
K 5 and 6. Investments and patent rights		......	......
K 7. Office furniture		46.50	29.20
K 8 and 9. Land and buildings used for electric purposes (real estate.—A.)		14,698.62	9,355.69
K 10. Steam plant		17,322.57	11,255.80
K 11. Water power plant		......	......
K 12. Electric plant		14,796.72	10,169.28
K 13. Lines (overhead.—A.)		21,616.31	14,657.30
K 14. Transformers		8,574.71	6,148.27
K 15. Meters		8,808.23	6,468.82
K 16. Services. (Included with lines.—A.)			
K 17. Lamps (globes.—A.)		10,465.49	
Arc	$6,451.84		
Incandescent	104.87		
Nernst	511.36		
			7,068.07
K 18. Other permanent works, inside wiring		817.97	817.97
K 19. Fuel on hand		265.00	265.00
K 20. Carbons on hand		95.00	95.00
K 21. Tools and appliances		150.00	150.00
K 22. Incandescent lamps on hand.		8.00	
Nernst	$10.00		
Incandescent	8.00		
			18.00
K 23. Globes and other electric fixtures on hand		162.00	12.00
K 24. Oil and waste		75.00	75.00
K 25. Miscellaneous supplies on hand—			
Electric material	$275.00		
Tools and appliances	150.00		
Horses and wagons	450.00		
			875.00
K 26. Sinking fund		13,138.01	13,138.01
K 27. Other assets—			
Nernst lamps	$40.00		
Horses and wagons	450.00		
		490.00	
K 28. ————			
K 29. Total assets		$128,656.10	$97,129.91

K 30. Do the values above given represent the original cost of the present assets, their present market value, or cost of duplication? See answer to K 30 for Chicopee.

	P.
As above	$97,129.71
Profit and loss balance	27,979.70
	$125,109.71 ($125,109.41 J. H. G.)

Total cost of plant as per books.

Real estate	$14,698.62
Steam plant	17,332.57
Electric plant	14,796.72
Lines	21,616.31
Lamps and globes	10,452.89
Transformers	8,574.71
Meters	8,808.23
Inside wiring	1,295.24
Office furniture	46.50
	$97,621.79

L—LIABILITIES.

		A.	P.
L 1.	As of date, end of last fiscal year, June 30, 1906.		
L 2.	Appropriation for construction	$45,745.14	$45,745.14
L 3.	Bonds (outstanding.—A.)	40,000.00	40,000.00
L 4.	Notes payable	......	......
L 5.	Unpaid bills (maintenance.—A.)	667.17	667.17
L 6.	Overdrafts for construction	4,663.77	4,663.77
L 7.	Appropriations for note payments	22,700.00	22,700.00
L 8.	Appropriation for sinking funds	11,200.00	11,200.00
L 9.	Interest accrued but not paid	133.33	133.33
L 10.	Total	$125,109.41	$125,109.41

M—RECEIPTS.[1]

			A.	P.
M 1.	For year ending June 30, 1906.			
M 2 and 3.	Private arc and incandescent lights unmetered		......	......
M 4.	Private lighting metered (and domestic lights)		$19,571.39	
	Commercial	$12,655.85 562.12 Dis.		
	Domestic	$6,918.19 299.27 Dis.		$18,712.65

---

[1] These receipts contain nothing for the value of street lighting, or for light in public buildings.—A.

		A.	P.
M 5, 6, and 7. Public arc and incandescent lights and public power		......	......
M 8. Commercial power		......	
	$962.24 103.50		$858.74
M 9. Electric power		$858.74	
M 10, 11, 12, 13, 14		......	......
M 15. Other receipts, steam sold		500.00	500.00
M 16. Total		$20,930.13	$20,071.39

N—Expenses.

		A.	P.
N 1. For year ending June 30, 1906.			
Production.			
N 2. Fuel		$11,180.37	$11,180.37
N 3. Oil and waste		217.93	217.93
N 4 and 5		......	......
N 6. Wages and salaries (at station.—A.)		4,373.20	4,373.20
N 7. Maintenance, repairs and renewals		1,370.37	1,370.37
(a) Building (station.—A.)	$174.30		
(b) Steam plant	708.36		
(c) Water power plant	....		
(d) Electric plant	487.71		
N 8. General expense		......	177.83
N 9. Current purchased (tools, appliances and incidental expenses.—A.)		177.83	......
N 10. Total production		$17,319.70	$17,319.70
Distribution.			
N 11. Wages and salaries		$930.95	$930.95
(a) Street arc lamp (globes.—P.)		......	142.22
(b) Street incandescent lamps		......	90.80
(c) General distribution		......	10.00
N 12. Expense beyond meter, stable expense		......	423.09
N 12a. Expense beyond meter		......	......
N 13. Supplies, tools and appliances (and stable expense.—A.)		133.09	......
N 14. Maintenance, repairs and renewals.			
(a), (b), (c) and (d) Lines, transformers and meters	$4,986.15		
(e) Carbons	231.34		
		......	5,217.49

		A.	P.
(f) Meters, lamps and lines	$4,986.15		
(g) Commercial arc lamps, globes; public (street, etc., lamps)	142.22		
(h) Commercial incandescent lamps; public (incandescent lamps)	90.80	$5,219.17	
N 15. Miscellaneous (carbons.—A).		231.34	......
N 16. Total		$6,814.55	$6,814.55
General.			
N 17. Directors' allowances		......	......
N 18 and 19. Salaries of officers, committee, commissioners, general office salaries		1,200.00	1,200.00
N 20. Rent of office		......	......
N 21. Office expenses		445.76	445.76
N 22. Legal expenses		40.70	40.70
N 23 and 24. Injuries, damages, claims, licenses and royalties		......	......
N 25. Insurance; fire, boiler, accident		726.80	726.80
N 26. Bad debts		91.75	91.75
N 27, 28, 29		......	......
N 30. Total general expenses		$2,505.01	$2,505.01
N 31. Total expenses		$26,639.26	$26,639.26
Resume.			
Total receipts			$20,071.39
Total expenses			26,639.26
Balance to profit and loss			$6,567.87

O—PROFIT AND LOSS.

O 1. For year ending June 30, 1906.		
Credit.		
O 2. Value of lighting in public building	$2,700.02	......
O 2a. Estimated value of street lighting	13,030.87	......
O 3. Appropriations for maintenance, interest and insurance	10,840.00	......
O 4. By appropriations for maintenance, for year	......	9,000.00
O 5. Appropriation for interest	......	1,600.00
O 6. Appropriation for depreciation (cash.—A.) (fund.—P.)	5,643.38	5,643.38
O 7. By income from sinking fund.	480.03	480.03

		A.	P.
O 8.	By printing and stationery...	$43.50	$43.50
O 9.	By balance (if deficit).......	......	29,979.70
O 10.	Total	$32,737.80	²$44,986.61
Debit.			
O 11.	To balance from last year, if any	Note (1)	$29,189.65
O 12.	To interest on bonds........	1,753.46	1,726.23
O 13.	To interest on notes, loans and deposits	......	27.23
O 14.	To balance of expense, manufacturing account.........	6,567.87	6,567.87
O 15.	To balance of appropriation, January 15, 1906......... (Returned to town treasury. —A.)—	1,832.25	1,832.25
O 16.	To depreciation (charged off. A.)	5,643.38	5,643.38
O 17, 18, 19, 20, 21	....	......	......
O 21a.	Surplus balance	16,940.84	......
O 22.	Total	$32,737.80	$44,986.61

Taunton.

K—Assets.

		A.	P.
K 1.	As of date, end of last fiscal year, June 30, 1906.		
K 2.	Cash on hand..............	$9,421.06	......
K 2a.	Cash on hand, town treasury— (a) Depreciation fund $15,739.98 (b) Maintenance .... 9,333.48 (c) Construction 87.58	......	$25,160.94
K 3.	Depreciation fund...........	15,739.88	......
K 4.	Sundry accounts due (electric light and power.—A.).....	7,522.53	7,522.53
K 5 and 6.	Investments and patent rights	......	......
K 7.	Office furniture.............	294.99	294.99
K 8 and 9.	Land and buildings (real estate.—A.).........	81,563.26	66,311.98
K 10.	Steam plant	96,138.37	72,749.33
K 11.	Water power plant..........	......	......
K 12.	Electric plant.............	56,509.96	41,570.88
K 13.	Lines (overhead)..........	49,708.56	35,797.30
K 14.	Transformers	21,220.81	17,334.45
K 15.	Meters	8,597.46	6,871.10

---

¹ See note on Chicopee Profit and Loss

² Column adds $46,716.61—J. H. G.

		A.	P.
K 16.	Services. (Included with lines.—A.)		
K 17.	Lamps (and globes.—A.)	$22,703.18	$16,532.23
K 18.	Other permanent works (tools and appliances.—A.)	4,588.20	4,588.20
K 19.	Fuel on hand	1,478.40	1,478.40
K 20.	Carbons on hand	148.00	148.00
K 21.	Inside wiring	1,473.83	1,473.83
K 21a.	Horses and wagons	350.32	350.32
K 22.	Incandescent lamps on hand	208.50	208.50
K 23.	Globes and other electric fixtures on hand	405.00	100.00
K 24.	Oil and waste	60.00	60.00
K 25.	Miscellaneous and other supplies on hand	......	305.00
K 26.	Sinking fund	48,503.84	48,503.84
K 27 and 28.	Other current and capital assets	......	......
K 29.	Total assets	$426,636.75	$347,361.82

K 30. Do the values above given represent the original cost of the present assets, their present market value, or the cost of duplication? See answer to K 30 for Chicopee.

L—LIABILITIES.

L 1. As of date, end of last fiscal year, June 30, 1906.

		A.	P.
L 2.	Appropriation for construction	$15,901.75	$15,901.05
L 3.	Bonds (outstanding.—A.)	320,500.00	320,500.00
L 4.	Notes payable	......	1,500.00
L 5.	Unpaid bills	......	1,672.04
	(a) For construction... $793.46		
	(b) For maintenance... 878.58		
		1,672.04	......
L 6, 7, 8		......	......
L 9.	Interest accrued but not due	993.52	993.52
L 10, 11		......	......
L 12.	Sinking fund (appropriation for.—A.)	20,604.29	20,604.29
L 13.	Appropriation for notes payments	1,500.00	......
L 14.	Total	$361,171.60	$361,171.60

M—RECEIPTS.[1]

M 1. For year ending June 30, 1906.

		A.	P.
M 2.	Private arc lights unmetered	$3,881.55	$3,881.55
M 3.	Private incandescent unmetered	2,244.56	2,244.56

---

[1] These receipts contain nothing for the value of street lighting.—A.

			A.	P.
M 4.	Private lighting metered		......	$26,121.36
	Private lighting metered commercial	$23,670.41		
	Private lighting metered domestic	2,450.95		
			$26,121.36	......
M 5.	Public arc lights		......	......
M 6.	Incandescent lights, public buildings		2,002.33	2,002.33
M 7.	Commercial power		18,975.07	18,975.07
M 8.	From fan motors		8.00	8.00
M 9, 10, 11, 12, 13, 14, 15			......	......
M 16.	Total		$53,232.87	$53,232.87

N—Expenses.

N 1. For year ending June 30, 1906.

Production.

N 2.	Fuel		$13,888.98	$13,888.98
N 3.	Oil and waste		566.25	566.25
N 4.	Water for boilers		53.71	53.71
N 5.			......	......
N 6.	Wages and salaries (at station.—A.)		10,319.54	10,319.54
N 7.	Maintenance, repairs and renewals		......	......
	(a) Building (station)	$114.66		
	(b) Steam plant	1,069.50		
	(c)	......		
	(d) Electric plant	661.45		
			1,845.61	1,845)61
N 8.	General expense		......	178.86
N 9.	Tools, appliances and incidentals		150.00	......
N 10.	Total production		$26,824.09	$26,852.95
Distribution.				
N 11.	Wages and salaries		$3,437.00	$3,437.00
	(a) Street arc lamps		......	......
	(b) Street incandescent lamps		......	1,084.12
	(c) General distributing globes		......	140.20
N 12.	Expense beyond meter		......	......
N 13.	Supplies, tools and appliances		30.00	30.00
N 14.	Maintenance, repairs and renewals—			
	(a) Lines, meters, lamps		3,899.12	3,899.12
	(b) Carbons		......	482.00
	(f) Commercial arc lamp globes (public street, etc., lamps)		140.20	......

		A.	P.
	(g) Commercial incandescent lamps (public incandescent lamp)	$1,084.12	......
N 15.	Miscellaneous (carbons.—A.)	482.00	......
N 16.	Total	$9,072.44	$9,072.44
General.			
N 17.	Directors' allowances	......	......
N 18.	Salaries of officers, committee and commissioners	......	1,800.00
N 19.	General office salaries	1,800.00	......
N 20.	Rent of office	......	......
N 21.	Office expenses (general.—P.)	311.69	311.69
N 22, 23, 24		......	......
N 25.	Insurance; fire, boiler, accident	546.67	......
N 26.	Stable expenses	1,219.20	1,219.20
N 27.	Other general expenses (station expenses.—A.)	28.86	......
N 27a.	Total general expense	3,906.42	......
N 28.	Total expense	$39,802.95	$39,802.95
Resume.			
	Total receipts	$53,232.87	$53,232.87
	Total expenses	39,802.95	39,802.95
	Balance to profit and loss	$13,429.92	$13,429.92

O—PROFIT AND LOSS.

		A.	P.
O 1.	For year ending June 30, 1906.		
Credit.			
O 2.	Estimated value of street lighting	$22,341.22	......
O 3.	By balance of receipts	13,429.92	$13,429.92
O 4.		......	......
O 5.	By income from sinking fund	1,740.97	1,740.97
O 6.	By interest appropriations	11,922.50	11,922.50
O 7.	By balance, if deficit	......	13,809.78
O 8.	Total	$49,434.61	$40,903.17
Debit.			
O 9.	To balance from last year, if any	......	$17,941.17
O 10.	To interest on bonds	11,922.50	11,922.50
O 11-14.		......	......
O 15.	To depreciation fund (charged off.—A.)	9,664.50	9,664.50
O 16.	To premium account	......	1,170.50
O 16a.	To sinking fund premium account, charged off by order of commissioners	1,170.50	......

	A.	P.
O 18. 19.	......	......
O 20. To bad debts	$204.50	$204.50
O 21. To balance if surplus	26,472.61	......
O 22. Total	$49,434.61	$40,903.17

DETAIL OF DEPRECIATION.—P.

Land and buildings	$1,932.90
Steam plant	3,189.29
Electric plant	1,642.97
Street lines	1,449.67
Arc lamps	676.51
Transformers	579.87
Electric meters	193.29
	$9,664.50

Westfield.

K—ASSETS.[1]

K 1. As of date, end of last fiscal year, June 30, 1906.

		A.	P.
K 2. Cash on hand—			
(a) General fund	$19,627.99	$19,627.99	......
(b) Depreciation fund	5,556.57		
		......	$25,184.56
K 3.		......	......
K 4. Sundry accounts due—			
(a) Jobbing	$2,413.21		
(b) Gas	7,287.12		
(c) Electricity	2,730.28	2,730.28	......
			12,430.61
K 4a. Jobbing		2,397.70	......
K 4b. Incandescent lamps		15.51	......
K 5, 6.		......	......
K 7. Office furniture		543.00	543.00
K 8, 9. Land and buildings, real estate		12,500.00	......
(a) Now used for electric lighting purposes	$8,525.35		
(b) Not used for electric light purposes	24,075.55		
		......	32,600.90
K 10. Steam plant		18,180.75	12,918.20
K 11.		......	......
K 12. Electric plant		15,979.53	12,586.31
K 13. Lines (overhead)		12,612.41	9,648.79
K 14. Transformers		3,903.05	3,311.00

---

[1] At Westfield, the general cash and the depreciation fund apply to an undetermined extent to the gas as well as to the electric business. —A.

		A.	P.
K 15. Meters		$2,570.94	......
(a) Electric	$2,230.15		
(b) Gas	6,681.47		
		......	$8,911.62
K 16. Inside wiring		886.62	886.62
K 17. Lamps and globes		4,440.47	......
(a) Arc	$3,231.01		
(b) Incandescent	38.19		
		......	3,269.20
K 18. Other permanent works—			
(a) Gas mains	$36,800.80		
(b) Gas machinery	18,957.05		
		......	55,757.85
K 19. Fuel on hand		2,230.34	......
(a) Gas	$3,597.92		
(b) Electric	2,230.34		
		......	5,828.26
K 20. Carbons on hand		84.95	84.95
K 21.		......	......
K 22. Incandescent lamps		81.60	81.60
K 23. Globes and other electric fixtures on hand (globes.—A.)		687.73	......
K 23a. Globes		......	70.94
K 24, 25. Miscellaneous supplies on hand—			
(a) Enrichers		......	108.59
(b) Purifying material		......	40.86
(c) Other gas materials		......	2,009.90
(d) Oil and waste		21.30	21.30
(e) Gas oil		......	51.21
(f) Other electric material		......	616.79
(g) Tools, gas		......	427.50
(h) Tools, electricity		......	570.00
K 26. Sinking fund		......	......
K 27. Other current assets		......	......
K 28. Other capital assets (tools and appliances.—A.)		570.00	......
K 29. Total		$100,064.17	$187,960.56

K 30. Do the values above given represent the original cost of the present assets, their present market value, or cost of duplication? See answer to K 30 for Chicopee.—A. Original cost, less depreciation charged off.—P.

COST OF PLANT.—P.

Gas Works:

R. E.	$35,300.00	
Machinery and other app.	27,367.82	
Street mains	50,463.01	
Meters	8,781.09	
		$121,911.92

Electric Works:		P.
R. E.	$12,500.00	
St. plant	18,180.75	
Electric plant	15,979.53	
Lines	12,612.41	
Lamps and globes	4,440.47	
Transformers	3,903.05	
Meters	2,570.94	
		$70,187.15
Other Works:		
Tools and appliances—Gas	$150.00	
Office furniture	543.00	
Tools and appliances—Electric	600.00	
Inside wiring	1,300.00	
Lamps	56.00	
		2,949.00
		$195,018.07

L.—Liabilities.

L 1. As of date, end of last fiscal year, June 30, 1906.

	A.	P.
L 2. Appropriation for construction	$41,000.00	$41,000.00
L 3. Bonds (Outstanding.—A.)	92,000.00	92,000.00
L 4. Interest due, but unpaid	420.00	420.00
L 5. Interest accrued, but not due	268.33	268.33
L 6, 7, 8, 9, 10, 11, 12, 13	......	......
L 14. Total	$133,688.33	$133,688.33
Profit and loss balance		54,272.23
		$187,960.56
1905 profit and loss balance		$37,399.86

The above liabilities were incurred to an undetermined extent on account of the town gas plant as well as on account of the electric plant.—A.

M—Receipts.[1]

M 1. For year ending June 30, 1906.

M 2. Private arc lights, unmetered	$798.60	$798.60
M 3. Private incandescent, unmetered	442.12	442.12
M 4. Private lighting, metered	9,797.94	9,797.94
M 5. Public arc lights (at $105.00 per lamp, and public incandescent lights at $35.00 per lamp.—P.)	......	......
M 6 and 7	......	......

---

[1] These receipts contain nothing for the value of street lighting. As the electric station and office were the only public buildings with electric light, no allowance should be made for the value of this light as income, since it was merely one of the expenses of the electric business and is covered by the operating expenses.—A.

		A.	P.
M 8. Commercial power..........		$1,589.15	$1,589.15
M 9, 10........................		......	......
M 11. Rents of meters.............		128.42	128.42
M 12, 13, 14.		......	......
M 15. Other receipts—			
(a) Gas	$30,089.63		
(b) Residuals	4,013.97		
		......	34,103.60
M 16. Total		$12,756.23	$46,859.83
Gas used in public buildings, not included in above income			$480.07
Electricity used in public buildings, not included in above......................			284.40
			$764.47—P.

N—EXPENSES.

		A.	P.
N 1. For year ending June 30, 1906.			
Production—			
N 2. Fuel		$5,646.00	......
(a) Gas	$9,116.53		
(b) Electricity	5,646.00		
		......	$14,762.53
N 3. Oil and waste—			
(a) Gas	$1,291.09		
(b) Electricity	486.10	486.10	
		......	1,777.19
N 4. Water for boilers—			
(a) Gas	$74.75		
(b) Electricity	50.00	50.00	
		......	124.75
N 5. Water power and water rights.		......	......
N 6. Wages and salaries (at station.—A.)—			
(a) Gas	$3,873.79		
(b) Electricity	3,236.55	3,236.55	
		......	7,110.34
N 7. Maintenance, repairs and renewals—			
(a^1) Purifying materials for gas..		......	412.19
(a) Building (Station.—A.)....		5.45	5.45
(b) Steam plant...............		305.78	305.78
(c) Gas plant.................		......	1,477.56
(d) Electric plant..............		61.07	61.07
(e) Tools, incidentals for gas.....		......	336.25
(f) Tools and incidentals, electricity		......	22.71
N 8.		......	......

		A.	P.
N 9. Tools, appliances and incidental expenses		$22.71	......
N 10. Total production............		$9,813.66	$26,425.82
Distribution—			
N 11. Wages and salaries—			
(a) (b) (c).....................		......	......
(d) Gas	$222.69		
(e) Electricity	559.37	559.37	
		......	$782.06
N 12. Expense beyond meter—			
(a) Carbons	$182.79		
(b) Globes	71.45		
(c) Incandescent lamps	60.20		
		......	314.44
N 13. Supplies, tools and appliances (Electric.—P.)		19.51	19.51
N 14. Maintenance, repairs and removals—			
(a) Meters, lamps, lines.........		1,169.02	1,169.02
(b) Commercial arc lamps, globes (public st., etc.), lamps.....		71.45	......
(c) Commercial incandescent lamps (public incandescent lamps)		60.20	......
(d) Gas mains................			247.88
(e) Gas meters................			701.65
N 15. Miscellaneous (Carbons.—A.).		182.79	......
N 16. Total		$2,062.34	$3,234.56
General—			
N 17. Directors' allowances.........		......	......
N 18. Salaries of officers, committees, commissioners—			
(a) Gas	$750.00		
(b) Electricity	750.00		
		......	$1,500.00
N 19. General office salaries—			
(a) Gas	$150.00		
(b) Electricity	150.00	$900.00	
		......	300.00
N 20. Rent of offices.................		......	......
N 21. Office expenses—			
(a) Gas	$508.80		
(b) Electricity	452.23	152.23	
		......	961.03
N 22, 23, 24....................		......	......
N 25. Insurance, fire, boiler and accident—			
(a) Gas	$215.53		
(b) Electricity	758.94	758.94	
		......	974.47

	A.	P.
N 26, 27, 28	......	......
N 29. Other general expenses (gas.—P.)	......	$8.68
N 30. Total general expenses	$2,111.17	$3,744.18
N 31. Total expenses	$13,987.17	$33,404.56
Resume—		
Total receipts	$12,756.23	$46,859.83
Total expenses	13,987.17	33,404.56
Balance to profit and loss	$1,230.94	*$13,455.27
* Credit gas business		$14,686.21
Debit electric business		1,230.94
		$13,455.27

O—PROFIT AND LOSS.*

		A.	P.
O 1. For year ending June 30, 1906.			
Credit—			
O 2. Estimated value of street lighting		$10,318.22	$37,399.86
O 3. By balance of receipts		......	13,455.27
O 4. By appropriation for maintenance (Apr. 2, 1906.—P.)		13,200.00	13,200.00
O 5. By ashes and junk		15.04	......
O 6. By other items (Jobbing.—A.)		41.00	......
O 7. By balance, if deficit		......	......
O 8. By appropriations for depreciation (Apr. 2, 1906.—P.)		....	9,581.76
O 9. By other items—			
(a) Piping	$34.03		
(b) Lamp posts	63.39		
(c) Junk and ashes (gas)	30.00		
(d) Junk and ashes (electric)	15.04		
(e) Jobbing, electricity	41.00		
		......	183.46
O 10. Total		$23,574.35	$73,820.35
Debit—			
O 11. To balance from last year, if any		......	......
O 12. To interest		$3,348.33	$3,348.33

---

* The items of money paid into city treasury, appropriations for depreciation, maintenance, interest on bonds and depreciation fund in this profit and loss account apply to an undetermined extent to the operation of the municipal gas plant as well as to the electric plant.—A.

			A.	P.
O 13.	To interest on notes, loans and deposits		......	......
O 14.	To balance for manufacturing account		$1,230.91	......
O 15.	Compensation for franchises..		......	......
O 16.	To cash paid into town treasury		2,433.11	$2,133.11
O 17.	To depreciation (Carried to depreciation fund.—A.)....		9,581.76	9,581.76
O 18.	To depreciation, gas plant.....		......	1,195.37
O 19.	To depreciation, electric plant.		......	2,829.82
O 20.	To other purposes—			
	(a) Suburban lighting bills	$89.00		
	(b) Gas stoves.......	70.73		
			......	159.73
O 21.	To balance, if surplus........		23,574.35	54,272.23
O 22.	Total		$6,980.21	$73,820.35

Abington and Rockland.

K—Assets.

K 1. As of date ending of last fiscal year, June 30, 1906.

		A.
K 2.	Cash on hand.........................	$12,664.93
K 3, 4.	....	......
K 5.	Investments (Charles St. house)..........	1,635.16
K 6.	Patent rights..........................	......
K 7.	Interest paid in advance................	33.89
K 8.	Lands and buildings (real estate).........	20,769.10
K 10.	Steam plant...........................	24,399.02
K 11.	Water power plant.....................	......
K 12.	Electric plant.........................	16,363.73
K 13.	Lines (a), (b).........................	20,515.89
K 14.	Transformers	3,830.64
K 15.	Meters	6,535.07
K 16.	Services. (Included with lines)...........	......
K 17.	Lamps, arc............................	1,500.00
K 18.	....	......
K 19.	Fuel on hand..........................	2,907.00
K 20.	Carbons on hand.......................	21.75
K 21.	Arc lamps on hand.....................	......
K 22.	Incandescent lamps on hand..............	586.96
K 23.	Globes and other electric fixtures on hand, electric heaters..........................	211.44
K 24.	Motors on hand........................	2,217.86
K 25.	Miscellaneous supplies, oil, water and electric materials	2,084.25
K 26.	Sinking fund..........................	......
K 27.	Due for electric light and power...........	1,140.21
K 28.	....	......
K 29.	Total assets..........................	$120,446.90

K 30. Do the values above given represent the original cost of the present assets, their present market value, or cost of duplication? Values above given for real estate, steam plant, electric plant, lights, transformers, meters and arc lamps, represent the total sums charged to construction for these items, minus sums that have been charged for depreciation and certain other amounts, and the values of other items are taken from the statement of assets made by the company; all as contained in the report to the Gas and Electric Light Commissioners, dated June 30, 1906. The same sums are reported for the costs and the values of plant assets by the companies.—A.

L—LIABILITIES.

L 1. As of date, end of last fiscal year, June 30, 1906.

		A.
L 2.	Capital stock	$75,000.00
L 3.	Bonds	25,000.00
L 4.	Notes not secured	4,000.00
L 5.	Unpaid bills	4,475.42
L 6.	Interest accrued but not due	312.50
L 7.	Total	$108,787.92

M—RECEIPTS.

M 1. For year ending June 30, 1906.

M 2.	Private lighting metered	$23,024.56
M 3.	Public incandescent lights	9,922.96
M 4.	Sale of current other than noted; electric power	1,981.60
M 5.	Total	$34,929.12

N—EXPENSES.

N 1. For year ending June 30, 1906.

Production.

N 2.	Fuel		$3,815.89
N 3.	Oil and waste		166.75
N 4.	Water for boilers		39.18
N 5.	Water power or water rights		......
N 6.	Wages and salaries		5,741.41
N 7.	Maintenance, repairs and renewals—		
	(a) Building (station)	$364.52	
	(b) Steam plant	367.50	
	(c) Electric plant	97.75	
			829.77
N 8.	Total production		$10,593.00

Distribution.

N 9.	Wages and salaries (a), (b). (c)		$680.66
N 10.	Maintenance, repairs, removals—		
	(a) Meters, lines, lamps, motors	$2,456.18	
	(b) Carbons	43.74	

			A.
	(c) Commercial incandescent lamps (public incandescent lamps)	$1,047.50	
			$3,547.42
N 11.	Total		$4,228.08
General.			
N 12.	Directors' allowances		$75.00
N 13.	Salaries of officers, committee, commissioners		2,270.30
N 14.	General office salaries		171.50
N 15.	Office expenses		772.29
N 16.	Insurance; fire, boiler, accident		381.05
N 17.	Current purchased		1,695.75
N 18.	Taxes		1,701.70
N 18a.	Total general expense		7,067.59
N 19.	Total expenses		$21,818.67
	Total receipts		$34,929.12
	Total expenses		21,888.67
	Balance to profit and loss		$13,040.45

O—Profit and Loss.

O 1. For year ending June 30, 1906.

Credit.		
O 2.	By balance from last year, if any	$4,277.43
O 3.	By balance of receipts	13,040.45
O 4.	By interest on loans or deposits	4.75
O 5.	By other items; rents	132.00
O 6.	Total	$17,454.63
O 7.	To interest on bonds	$1,250.00
O 8.	To dividends on stock	3,750.00
O 9.	Electric heaters	9.32
O 10.	Motors	786.33
O 11.	To balance, if surplus	11,658.98
O 12.	Total	$17,454.63

Attleboro.

K—Assets.

K 1. As of date, end of last fiscal year, June 30, 1906.

			A.	P.
K 2.	Cash on hand		$19,849.52	$19,849.52
K 3.	Sundry accounts due		2,135.85	......
	(a) Sundry	$2,135.85		
	(b) Consumers	9,616.32		
			......	11,752.17
K 4.	Investments, lands, buildings		1,000.00	......
K 5.	Land, buildings, real estate		28,931.95	......
	(a) Now used for electric lighting purposes	$28,931.95		

		A.	P.
	(b) Not used for electric lighting purposes $1,000.00		
		......	$29,931.95
K 6.	Steam plant................	$73,171.90	73,171.90
K 7.	Water power plant..........	2,537.63	2,537.63
K 8.	Electric plant.............	29,332.75	29,332.75
K 9.	Lines (overhead.—A.).......	33,730.93	33,730.93
K 10.	Transformers	12,545.44	12,545.44
K 11.	Meters	9,190.00	9,190.00
K 12.	Services. (Included with lines.—A.)		
K 13.	Tools and implements.......	......	1,662.12
K 14.	Lamps (arc.—A.)..........	2,767.44	2,767.44
K 15.	Automobile	......	779.85
K 16.	Fuel on hand..............	6,299.20	6,299.20
K 17.	Carbons on hand...........	95.62	95.62
K 18.	Arc lamps on hand..........	......	......
K 19.	Oil and waste..............	......	75.53
K 20.	Incandescent lamps on hand..	457.27	457.53
K 21.	Globes and other electric fixtures on hand (tools and implements.—A.)	1,794.76	132.65
K 22.	Motors on hand............	1,117.50	1,117.50
K 23.	Miscellaneous supplies (oil, waste, electric materials.—A.)	1,293.59	1,218.06
K 24.	Sinking fund...............	3,000.00	3,000.00
K 25.	Due for electric light and power	9,616.32	......
K 26.	Horses, wagons, automobile..	779.85	......
K 27.	Total assets................	$240,147.52	......

K 28. Do the values above given represent the original cost of the present assets, their present market value, or cost of duplication? See answer to K 30 for Abington and Rockland.—A. Original, less depreciation.—P.

COST OF PLANT AS PER BOOKS.—P.

Real estate............	$29,931.95
Steam plant...........	73,171.90
Electric plant.........	29,332.75
Lines	33,730.93
Transformers	12,545.44
Meters	9,190.00
Arc lamps............	2,767.44
Water power..........	2,537.63
Total	$193,208.04
Assessed value.........	$120,000.00

L—LIABILITIES.

(Mr. Adams and Mr. Prichard made identical statements for liabilities.—Gray.)

L	1.	As of date, end of last fiscal year, June 30, 1906.	P.
L	2.	Capital stock	$165,000.00
L	3.	Bonds	30,000.00
L	4.	Unpaid bills	9,418.54
L	5.	Unpaid dividends	2,475.00
L	6.	Interest accrued but not due	125.00
L	7.	Total	$207,048.54

M—RECEIPTS.

(Mr. Adams and Mr. Prichard made identical statements for receipts.—Gray.)

M	1.	For year ending June 30, 1906.	A. and P.
M	2.	Private arc lights unmetered	$366.00
M	3.	Private incandescent unmetered	994.75
M	4.	Private lighting metered	25,675.30
M	5.	Public arc lights (91 to 101 lamps at $75 per year)	7,077.96
M	6.	Public incandescent lights	4,018.50
M	7.	Commercial power	26,700.81
M	8.	Total	$64,833.32

N—EXPENSES.

N	1.	For year ending June 30, 1906.			
Production.				A.	P.
N	2.	Fuel		$10,833.54	$10,833.54
N	3.	Oil and waste		319.04	319.04
N	4.	Water for boilers		19.27	19.27
N	5.	Water power, water rights		......	......
N	6.	Wages and salaries (at station.—A.)		5,550.72	5,550.72
N	7.	Maintenance, repairs and renewals		......	1,270.06
		(a) Buildings	$145.21		
		(b) Steam plant	1,100.08		
		(c) Water power plant	80.68		
		(d) Electric plant	24.77		
				1,350.74	......
N	8.	General expense—			
		Station expense.—A.	$171.21	171.21	
			80.68		
				......	251.89
N	8a.	General expense—			
		(a) Rental for poles	$5.00		
		(b) Flowage	25.00		
				30.00	......
N	9.	Rental for poles and flowage		......	30.00
N	10.	Total production		$18,274.52	......

	A.	P.
Distribution.		
N 11. Wages and salaries	$888.67	$888.67
N 12.	......	......
N 13. Supplies, tools and appliances (installation of meters.—A.)	154.43	......
N 14. Maintenance, repairs and removals—		
(a) Lines overhead	1,635.27	1,635.27
(b) Meters, lamps and motors	131.61	......
(c) Transformers, meters, services, commercial arc lamps, commercial incandescent lamps, public (street) lamps	......	286.04
(d) Carbons	111.43	111.43
(e) Commercial incandescent lamps (public) incandescent lamps	258.17	258.17
N 15. Total	$3,179.58	$3,179.58
General.		
N 16. Salaries of officers, committee and commissioners	$2,300.00	$2,300.00
N 17. General office salaries	1,065.92	1,065.92
N 18. Rent of office	260.00	260.00
N 19. Office expenses and traveling	1,578.15	......
(a) Office expenses.... $1,321.95		
(b) Traveling expenses 256.20	......	1,578.15
N 20. Legal expenses	18.42	18.42
N 21. Insurance; fire, boiler, accident	811.72	811.72
N 22. Bad debts	1.00	1.00
N 23.	......	......
N 24. Taxes	1,892.57	......
N 25. Total general expenses	$7,927.78	$7,927.78
N 26. Total expenses	$29,381.88	$27,489.31
Resume.		
Total receipts	$64,833.32	$64,833.32
Total expenses	29,381.88	27,489.31
Balance to profit and loss	$35,451.44	$37,344.01

O—Profit and Loss.

	A.	P.
O 1. For year ending June 30, 1906.		
Credit.		
O 2. By balance from last year, if any, June 30, 1905	$18,320.94	......
O 3. By balance of receipts	35,451.44	$37,344.01
O 4. By interest on deposits (or loans.—P.)	151.84	151.84
O 5. By sale of motors; jobbing	23.41	23.41

		A.	P.
O 6.	By income from rents.......	$244.50	$244.50
O 7.	By balance (if deficit).......	......	......
O 8.	Total	$54,192.13	$56,084.76
Debit.			
O 9.	To balance from last year, if any	......	......
O 10.	To interest on bonds.........	$1,500.00	$1,500.00
O 11.	....	......	......
O 12.	To taxes...................	......	1,892.57
O 13.	....	......	......
O 14.	To dividends on stock........	8,075.00	8,075.00
O 15.	To depreciation (charged off.—A.) (fund.—P.)........	10,280.05	11,508.53
O 16.	Depreciation charged on electrical materials and supplies	135.34	......
O 17.	To depreciation charged on tools and implements......	287.38	......
O 18.	To depreciation charged on office furniture...........	298.65	......
O 19.	To depreciation charged on automobile	507.11	......
O 20.	To bad debts (prior to fiscal year.—P.)	9.60	9.60
O 21.	To balance (if surplus)......	33,098.98	33,098.98
O 22.	Total	$54,192.13	$56,084.70

Distribution of Depreciation.—P.

Buildings	$639.28
Steam and electricity...	4,603.27
Street lines...........	3,747.88
Transformers	660.28
Meters	483.68
Arc lights............	145.66
Office furniture........	298.65
Electric material and supplies	135.34
Tools and implements..	287.38
Automobile	507.11
	$11,508.53

Beverly.[1]

K—Assets.

K 1. As of date, end of last fiscal year, June 30, 1906.

		A.	P.
K 2.	Cash on hand..............	$1,958.32	$4,058.32
K 3.	Notes receivable...........	31,000.00	......

---

[1] At Beverly, the cash on hand, sundry accounts due, investments and notes receivable relate to an undetermined extent to the gas plant as well as to the electric plant.—A.

		A.	P.
K 4. Sundry accounts due........		$2,476.79	......
(a) Consumers, gas...	$8,376.34		
(b) Consumers, electricity	7,050.61		
(c) Sundry accounts..	2,476.79		
		......	$17,903.74
K 5. Investments		500.00	
(a) Notes receivable.	$31,000.00		
(b) Five building assocation shares....	500.00		
			31,500.00
K 6 and 7. Office furniture.......		1,058.51	1,058.51
K 8 and 9. Land and buildings (real estate.—A.)		24,578.89	......
(a) Gas	$48,041.01		
(b) Electricity	24,578.89		
		......	72,619.90
K 10. Steam plant................		50,784.13	50,784.13
K 11. Gas manufacturing plant....		......	16,831.46
K 12. Electric plant..............		43,136.82	......
K 13. Lines (overhead.—A.).......		55,905.80	......
(a) Gas	$65,048.78		
(b) Electricity	55,905.80		
		......	120,954.58
K 14. Transformers		11,167.81	11,167.81
K 15. Meters		7,174.47	......
(a) Gas	$11,724.47		
(b) Electricity	7,174.47		
		......	18,898.94
K 16. Services. (Included with lines.—A.)			
K 17. Lamps (arc.—A.)...........		5,914.02	5,914.02
K 18 and 19. Fuel on hand (gas.—P.)		......	1,242.50
K 20. Carbons on hand............		26.50	26.50
K 21. Arc lamps on hand (gas stoves)		......	897.75
K 22, 23, 24. Fan motors on hand..		82.92	82.92
K 25. Miscellaneous supplies on hand—			
(a) Oil and waste.............		13.00	13.00
(b) Tar		......	195.00
(c) Enrichers (gas)...........		......	24.00
K 26. Due for light and power.....		7,050.61	......
K 27. Total (electric—A.) assets (and certain other items, see K 28.—A.)		$245,828.59	$398,209.90

K 28. Do the values above given represent the original cost of the present assets, their present market value, or the cost of duplication? See answer to K 30 for Abington and Rockland.—A.

L—LIABILITIES.

		A.	P.
L 1.	As of date, end of last fiscal year, June 30, 1906.		
L 2.	Capital stock	$194,000.00	$194,000.00
L 3.	Bonds	11,800.00	11,800.00
L 4.	Notes payable	6,000.00	6,000.00
L 5.	Unpaid bills	7,212.45	7,212.45
L 6.	Deposits by customers	805.00	805.00
L 7.	Premium account	30,800.00	30,800.00
L 8.	Total	$250,617.45	$250,617.45
	Profit and loss surplus		147,592.45
			$398,209.90

These liabilities have been incurred to an undetermined extent on account of the gas plant.—A.

M—RECEIPTS.

			A.	P.
M 1.	For year ending June 30, 1906.			
M 2.	Private gas lights metered		......	$40,017.76
	(a) 25, 867,600 at $1.30.			
	(b) 4,336,100 at $1.40.			
M 3.	Private lighting metered		36,338.36	36,338.36
M 4.	Public arc lights (231 to 297 at $90.00.—A.)		25,738.35	25,738.35
M 5.	Commercial power		......	3,530.91
M 6.	Danvers gas light		......	2,896.46
M 7.	Current sold to Manchester Electric Light Co.		8,592.00	8,592.00
M 8.	Sale of current other than noted; electric power		3,530.91	......
M 9.	Rent of meters		392.89	......
	(a) Gas	$146.00		
	(b) Electricity	392.89		
			......	538.89
M 10.	Residuals (gas)		......	4,803.28
M 11.	Total		$74,592.51	$122,456.01

N—EXPENSES.

			A.	P.
N 1.	For year ending June 30, 1906.			
	Production.			
N 2.	Fuel		$8,866.95	$8,866.95
N 3.	Oil and waste		269.91	269.91
N 4.	Water for boilers		806.98	806.98
N 5.			......	......
N 6.	Wages and salaries		6,895.76	6,895.76
N 7.	Maintenance, repairs and renewals—			
	(a) Buildings (Station.—A.)	$46.48	$46.48	

		A.	P.
(b) Steam plant	$904.13	$904.13	
(c)	......	......	
(d) Electric plant	41.33	41.33	
		......	$991.94
N 8 and 9		......	......
N 10. Total production		$17,831.54	$17,831.54
Distribution.			
N 11. Wages and salaries		$306.90	$549.10
N 12 and 13		......	......
N 14. Maintenance, repairs and removals—			
(a) Lines overhead		2,578.50	......
(b) Lines		......	2,578.50
(c) Meters, lamps, motors		......	......
(d) Meters (globes)		......	368.62
(e) Carbons		......	434.85
(f) Commercial arc lamps, globes (public incandescent lamps)		368.62	......
N 15. Misc. carbons		434.85	......
N 16. Total for distribution		$3,688.87	$3,931.07
General.			
N 17. Directors' allowance		$975.00	$975.00
N 18. Salaries of officers, committee, commissioners		2,040.00	2,040.00
N 19. General office salaries		633.00	633.00
N 20. Rent of offices		300.00	300.00
N 21. Office expenses		375.55	375.55
N 22. Legal expenses		65.00	65.00
N 23 and 24		......	......
N 25. Insurance: fire, boiler, accident		1,024.93	1,024.93
N 26. Bad debts		194.88	194.88
N 27.		......	......
N 28. New business—			
(a) Advertising, soliciting and contributions	$202.70		
	39.50		
		242.20	......
N 29. Other general expenses (taxes.—A.)		3,014.63	......
N 30. Total general expenses		$8,865.19	$5,608.36
N 31. Total expense		$30,385.60	$27,370.97
Resume.			
Total receipts		$74,592.51	......
(a) Gas	$47,863.50		
(b) Electric	74,592.31		
		......	$122,455.81

		A.	P.
Total expenses		$30,385.60	......
(a) Gas	$34,633.80		
(b) Electric	27,370.97		
		......	$62,001.77
Balance to profit and loss		44,206.91	......
(a) Gas	$13,229.70		
(b) Electric	47,221.54		
		......	$60,451.24

Expenses.—P.

Gas—Manufacturing.	
Fuel	$14,564.70
Oil for enrichers	1,050.09
Purifying material	18.20
Water	187.15
Wages at works	5,713.25
Repairs and maintenance	1,639.29
Distribution.	
Wages	415.81
Tools and appliances	4,162.77
Repairs of meters	1,081.51
Office and Management.	
Directors' allowances	650.00
Salaries of officers	1,359.87
General salaries	2,604.65
Rent of offices	200.00
General office expenses	463.10
Miscellaneous.	
Insurance	185.02
Bad debts	251.16
Mass. Gas Ass'n dues	84.23
	$31,633.80

O—Profit and Loss.

Credit.

		A.	P.
O 1. For year ending June 30, 1906.			
O 2. By balance from last year, if any		$127,753.33	$127,753.33
O 3. By balance of receipts (electric.—A.)		44,206.91	......
(a) Gas	$13,229.70		
(b) Electricity	47,221.54		
		......	60,451.24
O 4. By interest on loans or deposits		1,757.35	1,757.35
O 5.		......	......
O 6. By other items—			
(a) Rents		105.00	105.00
(b) Bills receivable, charged as bad debts		73.69	......

		A.	P.
(c) Bills receivable.............		......	$12.12
(d) Jobbing		......	203.86
O 7. By balance, if deficit........		......	......
O 8. Total		$173,896.28	$190,282.90
Debit.			
O 9. To balance from last year, if any		......	......
O 10. To interest on bonds.........		$708.00	$708.00
O 11. To interest on notes, loans and deposits (Notes.—A.)......		232.95	232.95
O 12. Taxes—			
(a) Gas	$2,009.74		
(b) Electric	3,014.63		
		......	5,024.37
O 13.		......	......
O 14. To dividends on stock........		23,280.00	23,280.00
O 15. To depreciation (Charged off. —A.) (Fund.—P.)........		9,543.76	13,424.23
O 16 and 17......................		......	......
O 18. To other funds—			
(a) Water rates................		5.00	5.00
(b) Repairs on house...........		15.90	15.90
(c) Bills receivable, unable to correct		61.57	......
O 19 and 20......................		......	......
O 21. To balance, if surplus........		140,049.10	147,592.45
O 22. Total		$173,896.28	$190,282.90

Some of these profit and loss items apply to an undetermined extent to the operations of the gas plant.—A.

Fitchburg.[1]

K—ASSETS.

K 1. As of date, end of last fiscal year, June 30, 1906.			
K 2. Cash on hand...............		$21,490.45	$21,490.45
K 3. Notes receivable.............		......	......
K 4. Sundry accounts due........		150.00	......
(a) Gas	$1,387.15		
(b) Electricity	1,099.73		
(c) Miscellaneous ...	150.00		
		......	2,638.88
K 5, 6, 7 ————		......	......
K 8, 9. Land and buildings (Real estate.—A.)		66,078.68	......
(a) Gas	$37,389.49		
(b) Electricity	66,078.68		
		......	103,468.17

---

[1] At Fitchburg, the items of cash on hand and sundry accounts due relate to an undetermined extent to the gas as well as to the electric business.—A.

		A.	P.
K 10. Steam plant—			
(a) Gas	$60,747.48		
(b) Electricity, mfg.	61,297.63	$61,297.63	
		......	$122,045.11
K 11. ————		......	......
K 12. Electric plant		43,493.17	43,493.17
K 13. Lines		78,232.14	......
(a) Gas mains	60,711.01		
(b) Electric lines and underground	78,232.14		
		......	138,943.15
K 14. Transformers		6,745.24	6,745.24
K 15. Meters—			
(a) Gas	$13,000.00		
(b) Electricity	2,853.50	2,853.50	
		......	15,853.50
K 16. Services (Included with lines.—A.)		......	......
K 17. Arc lamps		2,059.00	2,059.00
K 18. ————		......	......
K 19. Fuel on hand—			
(a) Gas	$10,681.05		
(b) Electricity	1,688.05	1,688.05	
		......	12,369.10
K 20, 21. 22 ————		......	......
K 23. Stoves and gas fixtures on hand—			
(a) Stoves	$451.28		
(b) Fixtures	483.51		
		......	934.79
K 24. Motors on hand		2,058.44	2,058.44
K 25. Miscellaneous supplies on hand; gas enrichers		......	1,038.00
K 26. Sinking fund		......	......
K 27, 28. Other current and capital assets. Due for electric lights and power		1,099.73	......
K 29. Total assets		$287,246.03	$473,135.00

K 30-31. Do the values above given represent the original cost of the present assets, their present market value, or cost of duplication? See answer to K 30 for Abington and Rockland.

COST OF PLANT.—P.

Gas Works.

Real estate	$39,267.09
Machinery, appliances, etc.	58,869.88
Street mains	60,711.01
Meters	13,000.00
Total cost as per books	$171,847.98

Electric Works.

	P.
Real estate	$66,078.68
Steam plant	61,297.63
Electric plant	43,493.17
Lines and underground	78,232.14
Transformers	6,745.24
Meters	2,853.50
Arc lamps	2,059.00
Total cost as per books	$260,759.36
Grand total	$432,607.34

L—LIABILITIES.

L 1. As of date, end of last fiscal year, June 30, 1906.

		A.	P.
L 2.	Capital stock	$385,000.00	$385,000.00
L 3.	————	......	......
L 4.	Notes payable—		
	(a) Ordinary	445.00	445.00
	(b) Coupon	45,000.00	45,000.00
L 5.	————	......	......
L 6.	To deposits by customers	2,540.00	2,540.00
L 7 and 8	————	......	......
L 9.	Interest accrued, but not due	150.00	150.00
L 10.	Reserve fund	40,000.00	......
L 10a.	Premium on stock	......	40,000.00
L 11, 12, 13	————	......	......
L 14.	Total	$473,135.00	$473,135.00

These liabilities have been incurred to an undetermined extent on account of the gas plant.—A.

M—RECEIPTS.

M 1. For year ending June 30, 1906.

			A.	P.
M 2.	Private arc lights, unmetered		$120.00	$120.00
M 3.	Private incandescent, unmetered		169.95	169.95
M 4.	Private lighting, metered—			
	(a) Gas	$72,058.66		
	(b) Electricity	41,549.72	41,549.72	
			......	113,608.38
M 5.	Public arc lights (317 to 318 lamps, at $100 each.—A.)		32,112.83	32,112.83
M 6.	Public incandescent lights		1,772.74	1,772.74
M 7.	————		......	......
M 8.	Commercial power		......	30,340.42
M 9.	————		......	......
M 10.	Sale of current other than noted; electric power		30,340.42	......
M 11, 12, 13, 14	————		......	......
M 15.	Other receipts; steam heating		1,600.00	......

		A.	P.
M 15a. Other receipts—			
(a) Gas residuals....	$12,621.60		
(b) Steam heating...	1,600.00		
		......	$14,221.60
M 16. Total		$107,665.66	$192,345.92
N—EXPENSES.			
N 1. For year ending June 30, 1906.			
Production.			
N 2. Fuel—			
(a) Gas	$23,190.75		
(b) Electricity	17,918.41	$17,918.41	
		......	$41,109.16
N 3. Oil and waste..............		346.05	346.05
N 4. Water for boilers—			
(a) Gas	$154.16		
(b) Electricity	592.50	592.50	
		......	746.66
N 5. ————		......	......
N 6. Wages and salaries—			
(a) Gas	$5,228.83		
(b) Electricity	8,776.00	8,776.00	
		......	14,004.83
N 7. Maintenance, repairs and renewals—			
(a) Building (Station.—A.)....		1,647.03	......
(b) Steam plant...............		944.60	......
(c)		......	......
(d) Electric plant.............		117.81	......
(e) Gas		......	10,089.73
(f) Electricity		......	2,709.44
N 8. Other expenses—			
(a) Enrichers	$968.38		
(b) Purifying materials	137.67		
		......	1,106.05
N 9.		......	......
N 10. Total production............		$30,342.40	$70,111.92
Distribution.			
N 11. Wages and salaries (a), (b), (c)			
(d) Gas	$4,115.40		
(e) Electricity	7,400.46	$7,400.46	
		......	$11,515.86
N 12. Carbons		235.77	235.77
N 13.		......	......
N 14. Maintenance, repairs and renewals—			
(a) Lines, overhead and underground		11,141.36	......

	A.	P.
(b) Gas mains	......	$583.41
(c) Gas meters	......	521.20
(d) Meters, lamps and motors	$815.12	......
(e) Electric lines	......	11,141.36
(f) Electric meters	......	815.12
N 15.	......	......
N 16. Total	$19,592.71	$24,812.72
General.		
N 17. Directors' allowances	$290.00	......
(a) Gas	......	$310.00
(b) Electricity	......	290.00
N 18. Salaries of officers, committee, commissioners	2,500.00	......
(a) Gas	......	3,700.00
(b) Electricity	......	3,700.00
N 19. General office salaries	1,200.00	......
N 20. Rent of office	499.98	......
(a) Gas	......	389.98
(b) Electricity	......	499.98
N 21. Office expenses (and salaries. —P.)	2,769.42	......
(a) Gas	......	1,867.61
(b) Electricity	......	2,769.42
N 22. Taxes—		
(a) Gas	......	3,598.00
(b) Electricity	......	5,328.86
N 23, 24.	......	......
N 25. Insurance; fire, boiler accident.	657.84	......
(a) Gas—fire	......	21.76
(b) Electricity—fire	......	382.84
(c) Electricity, liability	......	275.00
N 26, 28.	......	......
N 29. Other general expenses—taxes.	5,328.86	......
N 30. Total general expenses	$13,246.10	$23,133.45
N 31. Total expenses	$63,181.21	$118,058.09
Resume.		
Total receipts	$107,665.66	$192,345.92
Total expenses	63,181.21	118,058.09
Balance to profit and loss	$44,484.45	$74,287.83

O—Profit and Loss.

O 1. For year ending June 30, 1906.		
Credit.		
O 2. By balance from last year, if any	......	......
O 3. By balance of (electric—A.) receipts	$44,484.45	......
(a) Gas	......	$29,803.38
(b) Electricity	......	44,484.45

	A.	P.
O 4. By interest on loans or deposits	......	$150.00
O 5. By incomes from premium on stock	$66,000.00	66,000.00
O 7.	......	......
O 8. Total	$110,484.45	$140,437.83
Debit.		
O 9. To balance from last year, if any	......	......
O 10.	......	......
O 11. To interest on notes, loans, deposits	$3,635.19	$3,635.19
O 12, 13.	......	......
O 14. To dividends on stock	34,650.00	34,650.00
O 15. To depreciation fund	......	......
O 16. To depreciation, electric plant (charged off)	52,247.25	......
O 17. To reserve fund	40,000.00	40,000.00
O 18. Other funds—		
(a) Electric bills	75.49	......
(b) Motors and electric heating	3,022.75	......
(c) Balance of M. Enright fund	80.00	......
O 19, 20.	......	......
O 21. To balance, if surplus	......	......
O 22. Total	......	$140,437.83

Some of these profit and loss items apply to an undetermined extent to the operation of the gas plant.—A.

Gardner.

K—Assets.

K 1. As of date, end of last fiscal year, June 30, 1906.

	A.	P.
K 2. Cash on hand	$19.88	$19.88
K 3.	......	......
K 4. Sundry accounts due	434.85	......
K 5. Investments	500.00	......
(a) Real estate mortgage	......	500.00
(b) Wood lot	......	754.60
(c)	......	2,316.45
K 6. Nernst lamps	2,152.73	2,152.73
K 7. Office furniture	408.98	408.98
K 8, 9. Land and buildings (real estate.—A.)	11,950.05	11,950.05
K 10. Steam plant	14,423.52	14,423.52
K 10a. Steam plant, oil engine	......	15,237.98
K 11. Power plant, Diesel engine	15,237.98	......
K 12. Electric plant	15,003.84	15,003.84
K 13. Lines overhead	17,274.21	17,274.21
K 14. Transformers	5,032.16	5,032.16

		A.	P.
K 15.	Meters	$7,591.55	$7,591.55
K 16.	Services. (Included with lines. —A.)		
K 17 and 18		......	......
K 19.	Fuel on hand	540.75	540.75
K 20.	Carbons on hand	46.38	46.38
K 21.	Arc lamps (on hand.—P.)	2,175.79	2,175.79
K 22.	Incandescent lamps on hand	966.36	966.36
K 23.	Carbons and other electric fixtures (globes.—A.)	121.06	121.06
K 24.	Oil and waste	58.74	58.74
K 25.	Miscellaneous supplies on hand (electric materials.—A.)	1,895.03	1,895.03
K 26.		......	......
K 27.	Wood lot	754.60	......
K 28.	Due for electric light and power	1,881.60	......
K 29.	Total assets	$98,470.06	$98,470.06

K 30, 31. Do the values above given represent the original cost of the present assets, their present market value, or cost of duplication? See answer to K 30 for Abington and Rockland.—A. Original, less depreciation.—P.

L—LIABILITIES.

(Messrs. Adams and Prichard make identical statements of the liabilities.—Gray.)

L 1. As of date, end of last fiscal year, June 30, 1906.

L 2.	Capital stock	$30,000.00
L 3.	Notes payable	47,300.00
L 4.	Unpaid bills	1,965.62
L 5.	Interest accrued but not due	35.29
L 6.	Reserve fund	15,000.00
L 7-13.		......
L 14.	Total	$94,300.91

(Although Mr. Prichard gives same items, he gives as a total $98,470.06.—Gray.)

M—RECEIPTS.

M 1. For the year ending June 30, 1906.

		A.	P.
M 2.	Private arc lights unmetered.	$666.34	......
M 3.	Private incandescent unmetered	16,157.34	$666.34
M 4.	Private lighting metered	......	16,157.34
M 5.	Public arc lights (52 lamps at $75 each.—A.)	3,910.00	3,910.00
M 6.	Public incandescent lights	360.00	360.00
M 7.		......	......
M 8.	Commercial power	......	3,009.71
M 9.	Electric power	2,614.86	......

	A.	P.
M 10.	......	......
M 11. Rents of meters	......	$35.15
M 12, 13, 14	......	......
M 15. Other receipts—		
(a) Electricity for heating and cooking	$394.85	......
(b) Rent of poles	35.15	......
M 16. Total	$24,138.54	$24,138.54

N—Expenses.

	A.	P.
N 1. For year ending June 30, 1906.		
Production.		
N 2. Fuel	$5,141.33	$5,141.33
N 3. Oil and waste	448.88	448.88
N 4. Water for boilers	90.00	90.00
N 5. Rent of storeroom	......	60.00
N 6. Wages and salaries (at station.—A.)	4,096.67	4,096.67
N 7. Maintenance, repairs and renewals—		
(a) Building (station.—A.)	286.24	286.24
(b) Steam plant	751.06	751.06
(c)	......	......
(d) Electric plant	114.57	114.57
N 8. General expense (rent of storeroom.—A.)	60.00	171.82
N 9. Tools and appliances	171.82	......
N 10. Total production	$11,160.57	$11,160.57
Distribution.		
N 11. Wages and salaries	$478.38	$478.38
N 12, 13, 14. Maintenance, repairs, removals—		
(a) (b) (c) (d) (e)	......	2,088.03
(a) Lines overhead	1,974.39	......
(d) Meters, lamps, motors	113.64	......
(f) Commercial arc lamps, globes	......	......
(h) Public (street, etc.) lamps	44.73	......
(i) (f) Street arc lamps, carbons	......	40.56
(j) (g) Commercial incandescent lamps	957.50	1,002.23
N 15. Miscellaneous. Carbons	40.56	......
N 16. Total	$3,609.20	......
General.		
N 17. Directors' allowances	......	......
N 18. Salaries of officers, committee, commissioners	$800.00	$800.00
N 19. General office salaries	......	......

		A.	P.
N 20.	Rent of offices	$90.00	$90.00
N 21.	Office expenses (Sundries.—A.)	49.24	813.59
N 22.	Legal expenses	31.00	31.00
N 23.	......	......	......
N 24.	Office expenses	740.28	......
N 25.	Insurance; fire, boiler, accident	735.66	735.66
N 26.	Bad debts	25.81	25.81
N 27.	Association dues	68.60	......
N 28.	New business, advertising, soliciting	73.31	......
N 29.	Other general expenses (taxes.—A.)	1,007.27	117.84
N 30.	Total general expenses	$3,621.17	......
N 31.	Total expenses	$18,390.94	$17,383.67
Resume.			
	Total receipts	$24,138.54	$24,138.54
	Total expenses	18,390.94	17,383.67
	Balance to profit and loss	$5,747.60	$6,754.87

O—Profit and Loss.

		A.	P.
O 1.	For year ending June 30, 1906.		
Credit.			
O 2.	By balance from last year, if any	$6,173.83	$6,173.83
O 3.	By balance of receipts	5,747.60	6,754.87
O 4.	......	......	......
O 5.	By power (1905)	6.00	6.00
O 6.	By other items— (a) Rent $6.00 (b) 1905 power 275.00	......	281.00
O 7.	By balance if deficit	......	......
O 8.	Total	$11,927.43	$13,209.70
Debit.			
O 9.	To balance from last year, if any	......	......
O 10.	To interest on bonds (first mortgage notes.—P.)	$800.00	$800.00
O 11.	To interest on notes	764.72	......
O 11a.	To interest on notes, loans, deposits	......	764.72
O 12.	To taxes	......	1,007.27
O 13.	......	......	......
O 14.	To dividends on stock at 10 per cent	3,000.00	3,000.00

		A.	P.
O 15.	To depreciation (charged off.—A.)	$3,079.92	$3,354.92
O 16, 17.		......	......
O 18.	To discounts	2.75	......
O 18a.	To discounts, bad debts and fuel, 1905	......	113.64
O 19.	To bad debts	15.30	......
O 20.	To jobbing account, fuel, 1905	95.76	......
O 21.	To balance, if surplus	4,169.15	4,169.15
O 22.	Total	$11,927.43	$13,209.70

DEPRECIATION.—P.

Steam and electric plant and buildings	$2,285.02
Transformers	197.57
Meters	336.78
Arc lamps	535.55
	$3,354.92

Northampton.

K—ASSETS.

K 1. As of date, end of last fiscal year, June 30, 1906.

		A.	P.
K 2.	Cash on hand	$11,123.00	$11,123.00
K 3.		......	......
K 4.	Sundry accounts due	560.91	4,732.76
K 5.	Investments—old station property (including two horses.—P.)	7,000.00	7,000.00
K 6, 7.		......	......
K 8 and 9.	Land, buildings, real estate (a), (b)	33,000.00	33,000.00
K 10.	Steam plant	40,830.34	40,830.34
K 11.		......	......
K 12.	Electric plant	32,276.11	32,276.11
K 13.	Lines (overhead.—P.)	35,393.27	35,393.27
K 14.	Transformers	8,517.98	8,517.98
K 15.	Meters	9,595.78	9,595.78
K 16.	Services. (Included with lines.—A.)	......	......
K 17.	Lamps, arc	5,290.70	5,290.70
K 18.		......	......
K 19.	Fuel on hand	1,134.00	1,134.00
K 20.	Carbons on hand	110.00	110.00
K 21.	Arc lamps on hand	......	......
K 22.	Incandescent lamps on hand	515.00	515.00
K 23.	Globes and other electric fixtures on hand	543.11	543.11
K 24.	Motors on hand	100.00	100.00

	A.	P.
K 25. Miscellaneous supplies on hand (oil, waste, electric material.—A.)	$179.00	......
(a) Oil and waste	42.90	$42.90
(b)	......	560.94
(c)	......	179.00
(d) Horses, wagons	......	575.40
K 26.	......	......
K 27. Due for electric light and power	4,732.76	......
K 28. Other capital assets; horses, wagons, etc.	575.40	......
K 29. Total assets	$191,520.29	$191,520.29

K 30, 31. Do the values above given represent the original cost of the present assets, their present market value, or cost of duplication? See answer to K 30 for Abington and Rockland.—A. Original cost, less replacement.—P.

L—Liabilities.

(Messrs. Adams and Prichard made identical statements for the liabilities.—Gray.)

L 1. As of date, end of last fiscal year, June 30, 1906.

L 2. Capital stock	$117,400.00
L 3. Notes payable	1,000.00
L 4. Unpaid bills	378.53
L 5. Depreciation fund	2,500.00
L 6 to 13, inclusive	......
L 14. Total	$121,278.53

M—Receipts.

(Messrs. Adams and Prichard make identical statements for the receipts.—Gray.)

M 1. For year ending June 30, 1906.

M 2. Private arc lights unmetered	$4,368.33
M 3. Private incandescent lights unmetered	1,277.48
M 4. Private lighting, metered	36,767.42
M 5. Public arc lights	[1]10,074.01
M 6. Public incandescent lights	1,637.35
M 7. ————	......
M 8. Commercial power	5,948.12
M 9 to 15, inclusive	......
M 16. Total	$60,072.71

N—Expenses.

N 1. For year ending June 30, 1906.

Production.	A.	P.
N 2. Fuel	$12,146.64	$12,146.64
N 3. Oil and waste	220.22	220.22

---

[1] 24 and 105 lamps at $100 and $74, respectively, per lamp per year.

	A.	P.
N 4. Water for boilers	$30.78	$30.78
N 5. ————	......	......
N 6. Wages and salaries	4,320.00	4,320.00
N 7. Maintenance, repairs and renewals—		
(a) Buildings (station.—A.)	3.40	3.40
(b) Steam plant	957.62	957.62
(c) Electric plant	82.18	82.18
N 8, 9 ————	......	......
N 10. Total production	$17,760.84	$17,760.84
Distribution.		
N 11. Wages and salaries	$4.802.22	$4,802.22
N 12. Expenses beyond meter	......	1,473.28
N 13. Supplies, tools, appliances (horse keeping)	448.03	......
N 14. Maintenance, repairs and removals—		
(a) Lines overhead	153.88	......
(b) Meters, lamps, motors	60.00	......
(c) Carbons	118.65	......
(d) Commercial incandescent lamps	1,140.75	......
N 15. ————	......	......
N 16. Total distribution	$6,723.53	$6,275.50
General.		
N 17. ————	......	......
N 18, 19. Salaries of officers, committee, commissioners, general office salaries	$2,610.00	......
N 19. General office salaries	......	$2,610.00
N 20. Rent of office	180.00	180.00
N 21. Office expenses	376.45	376.45
N 22, 23, 24 ————	......	......
N 25. Insurance; fire, boiler, accident	782.51	782.51
N 26-28. ————	......	......
N 29. Other general expenses (taxes.—A.)	2,443.88	......
(a) Taxes	......	2,443.88
(b) Stable	......	448.03
N 30. Total general expenses	$6,392.84	$6,840.87
N 31. Total expenses	$30,877.21	$30,877.21
Resume.		
Total receipts	$60,072.71	$60,072.71
Total expenses	30,877.21	30,877.21
Balance to profit and loss	$29,195.50	$29,195.50

O—PROFIT AND LOSS.

		A.	P.
O 1.	For year ending June 30, 1906.		
	Credit.		
O 2.	By balance from last year, if any	$54,412.35	$54,412.35
O 3.	By balance of receipts	29,195.50	29,195.50
O 4.	————	......	......
O 5.	By jobbing	506.79	......
O 6.	By other items (rent.—A.)	467.12	......
	(a) Rent	......	467.12
	(b) Jobbing	......	506.79
O 7.	————	......	......
O 8.	Total	$84,581.76	$84,581.76
	Debit.		
O 9, 10	————	......	......
O 11.	To interest on notes, loans, deposits (notes.—A.)	$100.00	$100.00
O 12, 13	————	......	......
O 14.	To dividends on stock (10 per cent.—P.)	11,740.00	11,740.00
O 15.	To depreciation fund	......	2,500.00
O 15a.	For general depreciation to apply later, on electric plant, lines, etc.	2,500.00	......
O 16 to 20	————	......	......
O 21.	To balance, if surplus	70,241.76	70,241.76
O 22.	Total	$84,581.76	$84,581.76

Salem.

K—ASSETS.

		A.	P.
K 1.	As of date, end of last fiscal year, June 30, 1906.		
K 2.	Cash on hand	$15,050.85	$15,050.85
K 3.	Notes receivable	212.00	212.00
K 4.	Sundry accounts due	485.13	......
	(a) Sundry $485.13		
	(b) Consumers 13,513.57		
		......	13,988.70
K 5.	————	......	......
K 6.	Nernst lamps	8,000.00	......
K 7.	————	......	......
K 8, 9.	Land and buildings (Real estate.—A.)	64,575.00	64,575.00
K 10.	Steam plant	90,700.00	90,700.00
K 11.	————	......	......
K 12.	Electric plant	42,000.00	42,000.00
K 13.	Lines (Overhead.—P.)	100,000.00	100,000.00
K 14.	Transformers	10,000.00	10,000.00
K 15.	Meters	18,000.00	18,000.00

		A.	P.
K 16.	Services (Included with lines.—A.)	......	......
K 17.	Lamps; incandescent, arcs....	$6,000.00	......
	(a) Arc $6,000.00		
	(b) Nernst 8,000.00		
		......	$14,000.00
K 18.	————	......	......
K 19.	Fuel on hand..............	16,130.57	16,130.57
K 20.	Carbons on hand............	285.00	285.00
K 21.	————	......	......
K 22.	Incandescent lamps on hand..	2,371.64	2,371.64
K 23.	Globes and other electric fixtures on hand (Globes.—A.)	194.75	6,229.36
K 24.	Horses and wagons..........	1,500.00	1,500.00
K 25.	Misc. supplies on hand (Electric materials.—A.).......	6,034.61	......
K 26.	————	......	......
K 27.	Due for electric light and power	13,513.57	......
K 28.	————	......	......
K 29.	Total assets................	$395,053.12	$395,053.12

K 30 and 31. Do the values above given represent the original cost of the present assets, their present market value, or cost of duplication? See answer to K 30 for Abington and Rockland.—A. Book values, depreciation deducted from original costs.—P.

L—Liabilities.

L 1. As of date, end of last fiscal year, June 30, 1906.

		A.	P.
L 2.	Capital stock..............	$275,000.00	$275,000.00
L 3.	————	......	......
L 4.	Notes payable (Coupon notes.—A.)	50,000.00	50,000.00
L 5.	Unpaid bills................	4,811.65	4,811.65
L 6.	Deposits by customers........	471.79	471.79
L 7, 8	————	......	......
L 9.	Interest accrued, but not paid..	333.33	333.33
L 10.	Reserve funds..............	43,946.00	43,946.00
L 11, 12	————	......	......
L 13.	Other liabilities (Balance.—P.)	......	20,490.35
L 14.	Total	$374,562.77	$395,053.12

M—Receipts.

M 1. For year ending June 30, 1906.

		A.	P.
M 2.	Private arc lights, unmetered.	......	......
M 3.	Private incandescent, unmetered	$5,497.71	$5,497.71
M 4.	Private lighting, metered....	78,677.40	78,677.40

		A.	P.
M	5. Public arc lights (318 to 333 lamps, at $95.—A.) (At $95.—P.)	$31,690.50	$31,690.50
M	6. Public incandescent lights	8,898.28	8,898.28
M	7. ————	......	......
M	8. Commercial power	......	14,632.44
M	8a. Electric power	14,632.44	......
M	9. Electric railway power	9,797.11	9,797.11
M	10. ————	......	......
M	11. Rents of real estate	......	54.26
M	11a. Rents	54.26	......
M	12. Rent of motors, fixtures and appliances	318.54	318.54
M	13, 14, 15	......	......
M	16. Total	$149,566.24	$149,566.24

N—EXPENSES.

		A.	P.
N	1. For year ending June 30, 1906.		
	Production.		
N	2. Fuel	$18,801.33	$18,801.33
N	3. Oil and waste	955.53	955.53
N	4. Water for boilers	672.36	672.36
N	5. ————	......	......
N	6. Wages and salaries	11,889.11	11,889.11
N	7. Maintenance, repairs and renewals—		
	(a) Buildings (Station and wharf.—A.)	3,842.63	3,842.63
	(b) Steam plant (Improvement expense.—A.)	5,708.07	5,708.07
	(c) Electric plant	58.64	58.64
N	8, 9 ————	......	......
N	10. Total	$41,927.67	$41,927.67
	Distribution.		
N	11. Wages and salaries	$6,223.72	$6,223.72
N	12, 13 ————	......	......
N	14. Maintenance, repairs and removals—		
	(a) Lines, overhead	14,756.31	......
	(b) Globes	586.01	586.01
	(c) Carbons	668.07	668.07
	(d) Incandescent lights	4,246.46	4,246.46
	(e), (f), (g) Lines, overhead, underground and transformers	......	14,756.31
N	15. ————	......	......
N	16. Total distribution	$26,480.57	$26,480.57

(In original, Mr. Prichard gives as total distribution, $68,408.24.

	General.	A.	P.
N 17.	Directors' allowances.........	$600.00	$600.00
N 18.	Salaries of officers, committee and commissioners........	2,000.00	2,000.00
N 19.	General office salaries.......	9,267.51	9,267.51
N 20.	Rent of offices..............	300.00	300.00
N 21.	Office expenses..............	954.63	954.63
N 22.	Legal expenses..............	205.96	205.96
N 23, 24	———————	......	......
N 25.	Insurance; fire, boiler, accident	1,344.34	1,344.34
N 26.	Bad debts..................	564.38	564.38
N 27.	———————	......	......
N 28.	Taxes	7,414.80	......
N 29.	Other general expenses (incidental expenses.—A.)......	1,164.27	1,164.27
N 30.	Total general expenses.......	$23,815.89	$16,401.09
N 31.	Total expenses..............	$92,224.13	$84,809.33
	Résumé—		
	Total receipts..............	$149,566.24	$149,566.24
	Total expenses..............	92,224.13	84,809.33
	Balance to profit and loss.....	$57,342.11	$64,756.91

O—PROFIT AND LOSS.

		A.	P.
O 1.	For year ending June 30, 1906.		
	Credit—		
O 2.	By balance from last year, if any	$16,895.62	$16,895.62
O 3.	By balance of receipts.......	57,342.11	64,756.91
O 4.	By interest (temporary funds in bank.—A.)	365.81	365.81
O 5.	———————	......	......
O 6.	By other items—jobbing account	3,342.13	3,342.13
O 7.	By balance if deficit.........	......	......
O 8.	Total	$77,945.67	$85,360.47
	Debit—		
O 9.	To balance from last year, if any	......	......
O 10.	———————	......	......
O 11.	To interest on notes (10 year notes.—A.)	2,000.00	2,000.00
O 12.	To taxes	......	7,414.80
O 13.	———————	......	......
O 14.	To dividends on stock (at 8 per cent.—P.)	22,000.00	22,000.00
O 15.	To depreciation (charged off —A.)	31,560.65	32,255.32

		A.	P.
O 16.	———	......	......
O 17.	To reserve fund	$1,200.00	$1,200.00
O 18.	To repair shop account (discontinued)	500.00	......
O 19.	———	......	......
O 20.	To horses, wagons and harness	194.67	......
O 21.	To balance if surplus	20,490.35	20,490.35
O 22.	Total	$77,945.67	$85,360.47

Depreciation Detail—	P.
Steam, electric plant and buildings	$19,877.97
Transformer	2,602.86
Meters	4,095.35
Arc lamps	3,131.83
Lines	1,852.64
Horses and wagons	194.67
Repair shop (discontinued)	500.00
	$32,255.32

Uxbridge and Northbridge.

(The financial statement below is made by Mr. Adams.)

K—ASSETS.

		A.
K 1.	As of date, end of last fiscal year, June 30, 1906.	
K 2.	Cash on hand	$166.00
K 3.	Notes receivable	97.59
K 4.	Sundry accounts due	605.52
K 5.	Insurance, unexpired interest	40.20
K 6.	Moving account	20,190.00
K 7.	Office furniture	110.53
K 8-9.	Land and buildings, real estate	26,740.87
K 10.	Steam plant	34,736.22
K 11.	———	......
K 12.	Electric plant	25,025.73
K 13.	Lines overhead	85,143.28
K 14.	Transformers	17,159.21
K 15.	Meters	6,326.37
K 16.	Services. (Included with lines.)	
K 17.	Lamps, arc	4,432.26
K 18.	Other permanent works. (Side track)	1,892.35
K 19.	Fuel on hand	242.03
K 20.	Carbons on hand	10.63
K 21.	———	......
K 22.	Incandescent lamps on hand	603.73
K 23.	Globes and other electrical fixtures on hand	18.00
K 24.	———	......
K 25.	Miscellaneous supplies on hand—oil and waste, electrical material	1,485.54
K 26.	———	......

		A.
K 27.	Other current assets due for electric light and power	$4,510.99
K 28.	Horses, wagons, etc	1,294.47
K 29.	Total assets	$230,831.52

K 30-31. Do the values above given represent the original cost of the present assets, their present market value or cost of duplication? See answer to K 30 for Abington and Rockland.

L—LIABILITIES.

L 1.	As of date, June 30, 1906.	
L 2.	Capital stock	$39,400.00
L 3.	Notes payable—unsecured	11,146.11
L 4.	Unpaid bills	6,847.03
L 5.	Interest accrued but not due	1,620.01
L 6.	Other liabilities:	
	(a) Coupon notes unsecured	11,000.00
	(b) Mortgage notes	169,800.00
L 7.	Total	$239,813.15

M—RECEIPTS.

M 1.	For year ending June 30, 1906.		
M 2.	Private arc lights unmetered		$154.50
M 3.	Private incandescent unmetered		2,251.62
M 4.	Private light metered		11,832.00
M 5.	Public arc lights (13 lamps at $67 per lamp per year.)		1,010.31
M 6.	Public incandescent lights		5,827.21
M 7.	Electric railway power		4,799.85
M 8.	Sale of current other than noted		561.90
M 9.	Rents of meters		141.00
M 10.	Other receipts—Amt. of current sold to other companies:		
	(1) Milbury Electric, 100,790 K. W. H.	$3,797.34	
	(2) Grafton Electric, 77,677 K. W. H.	2,978.59	
	(3) Douglas Electric, 25,157 K. W. H.	1,006.28	
			7,782.21
M 11.	Total		$34,360.60

N—EXPENSES.

N 1.	For year ending June 30, 1906.	
	Production—	
N 2.	Fuel	$11,115.45
N 3.	Oil and waste	437.12
N 4-5	———	......
N 6.	Wages and salaries	4,610.12

			A.
N 7.	Maintenance, repairs, renewals:		
	(a) Buildings (station)	$59.71	
	(b) Steam plant	1,005.96	
	(c) ————	......	
	(d) Electric plant	225.09	
			$1,290.76
N 8.	Tools and appliances		379.18
N 9.	————		......
N 10.	Total production		$17,832.63
	Distribution—		
N 11.	Wages and salaries		$2,215.18
N 12.	————		......
N 13.	Supplies, tools and appliances		48.08
N 14.	Maintenance, repairs, removals:		
	(a) Lines overhead	$1,559.64	
	(b), (d) Meters, lamps and motors.	32.59	
	(c), (g), (i) Commercial incandescent lamps (public incandescent lamps)	115.27	
			1,707.50
N 15.	Miscellaneous. Carbons		11.62
N 16.	Total distribution		$3,982.38
	General—		
N 17.	Directors' allowances		$30.00
N 18.	Salaries of officers		300.00
N 19.	————		......
N 20.	Rent of offices		120.00
N 21.	Office expenses		658.48
N 22-24.	————		......
N 25.	Insurance, fire, boiler, accident		568.30
N 26-28.	————		......
N 29.	Other general expenses. Taxes		811.15
N 30.	Total general expenses		$2,487.93
N 31.	Total expenses		$24,302.94
	Resume—		
	Total receipts	$34,360.60	
	Total expenses	24,302.94	
	Balance to profit and loss	$10,057.66	

O—Profit and Loss.

O 1.	For year ending June 30, 1906.	
	Credit—	
O 2.	By balance from last year, if any	$......
O 3.	By balance of receipts	10,057.66
O 4.	By balance, if deficit	8,981.63
O 5.	Total	$19,039.29

Debit—

O 6.	To balance from last year, if any		P. $7,886.32
O 7.	To interest on notes		11,152.97
	(a) Mortgage coupon	$10,504.17	
	(b) Plain	648.80	
O 8.	Total		$19,039.29

TABLE A.

Data of Electric Plants in Massachusetts.

Year ending June 30, 1906.—A.

Location of plant.	*K. W. hours sold for light by meter per lighting consumer.*	*Per cent. of metered energy sold for light.*	*Per cent. of metered energy sold for power.*
Danvers	260	40.9	59.0
Holyoke	889	27.4	72.5
North Attleboro	366	100.0	0.0
Peabody	249	95.3	4.6
Taunton	710	34.1	65.8
Abington	262	75.3	24.6
Attleboro	613	22.6	77.3
Beverly	482	65.5	34.4
Fitchburg	591	19.7	80.2
Gardner	217	69.6	30.3
Salem	489	67.9	32.0
Uxbridge	310	89.3	10.6

All per meters of consumers.

TABLE B.

Data of Municipal Electric Plants in Massachusetts.

Year of June 30, 1906.—A.

	Location of Plant					
	Danvers.	*Holyoke.*	*Marblehead.*	*North Attleboro.*	*Peabody.*	*Taunton.*
Station expense per K. W. H. generated (cents)	2.57	1.54	2.39	2.97	2.81	1.51
Total expense per K. W. H. generated (cents)	3.74	2.19	4.29	3.90	4.33	2.24
Income per K. W. H. sold for power by meter (cents)	2.20	2.28	....	....	11.60	4.32
Income per K. W. H. sold for light by meter (cents)	10.00	10.48	....	15.00	12.42	12.37
K. W. H. generated for street lamps per inhabitant	7.90	16.87	23.65	10.29	19.87	15.91
K. W. H. generated for commercial purposes per consumer	874	3,734	314	440	587	3,822
Per cent. of consumers to inhabitants	5.07	1.20	9.89	3.55	4.61	1.07

TABLE C.

Data of Private Electric Plants in Massachusetts.

Year of June 30, 1906.—A.

	Location of Plant					
	Abington.	*Attleboro.*	*Beverly.*	*Fitchburg.*	*Gardner.*	*Salem.*
Station expense per K. W. H. generated (cents)	2.96	....	1.71	1.07	2.95	1.36
Total expense per K. W. H. generated (cents)	6.12	....	2.92	2.22	4.87	3.15
With taxes deducted, the total expense per K. W. H generated is	5.65	....	2.63	2.04	4.61	2.90
Income per K. W. H. sold for power by meter (cents)	4.62	3.02	2.62	2.55	6.28	4.43
Income per K. W. H. sold for light by meter (cents)	17.55	9.94	14.25	14.27	....	11.23
K. W. H. generated for street lamps per inhabitant	9.30	....	28.49	19.11	3.04	18.65
K. W. H. generated for commercial purposes per consumer	503	....	[1]920	4,297	624	1,526
Per cent. of consumers to inhabitants	4.39	3.38	3.44	1.55	4.53	3.84

---

[1] Not including sales to other companies.

INDEX

Volume II

By FAY N. SEATON

Abington and Rockland, Electric Light and Power Co. of: see Massachusetts Electric Works.

Accidents: in Philadelphia gas works, 514-16; observance by Philadelphia gas works of laws relating to safeguards against, [illegible].

Accounting by works: water, 363-6; Wheeling gas, [illegible]-71; of Philadelphia gas under trustees unreliable, 595-6; Philadelphia gas, 611-12; electric, 806-14; Mass. electric, 1117-22.

Adams, Alton D.: Reports on Massachusetts electric works: History and Legislation, [illegible] *et seq.*; Labor and Politics, 916 *et seq.*; Engineering Matters, 9[illegible]5 *et seq.*; Financial Matters, 1101 *et seq.*

Air mixed with gas: 547.

Allegheny municipal electric works: Reports on Labor and Politics, 750 ff., [illegible] ff.; Political influence: evils of, 750-1; of companies, 752; of councilmen and mayors, 753; political assessments of employees, 752, 753; political activity of employees, 753; employee voters, 896; Management, 751; Council committees, 751-2; Employees excessive, 753; favoritism and lack of discipline of, 753-4; character of, [illegible]; Wages and hours, [illegible]; salaries, [illegible]; Year covered by investigation, [illegible]; Boilers, 759; Engines: steam, [illegible]; auxiliary, 761; Auxiliary apparatus, 761; Dynamos, 762-3; Transformers: station, 764-[illegible]; line, 771; Overhead lines, [illegible]-7; Lamps: arc, 768, [illegible]; incandescent, [illegible], 776; hours of, [illegible]; no charge for, [illegible]; ownership of [illegible]; Motors and meters, [illegible]; Appraisal, 771-5; Services, 775; maps of, [illegible]; Output and consumption, [illegible]; Population of city and area supplied, 780; Current regulation, 781, 782; Outages, [illegible]; Service: character of, 781 *et seq.*; hours of, [illegible]; interruptions of, 784; Voltage, [illegible]; Extensions, [illegible], 786, 787; Other work done by direct employment, 787; Purchase of supplies, [illegible]; Condition of plant and equipment, [illegible]; Ventilation, and [illegible] of machinery, [illegible]; Badges, [illegible]; Telephones, [illegible]; Attendance at [illegible]; Reports of operation to manager, [illegible]; [illegible] rooms, [illegible]; Care of [illegible]; [illegible]; Accounts: [illegible] of, [illegible]; charging of items [illegible]; [illegible] separate from [illegible]; charging of particular items, [illegible]; [illegible] charged, [illegible]; credits [illegible]; [illegible] accounts, 812; [illegible] from financial statement, [illegible]; Free service, 812, 813, [illegible]; Meeting of deficits, 814; Interest rate compared with companies, 814-15; Appropriations for, 817, 834; Liabilities: cancelled, 818; provision for payment of, 818, 834; present, 841; Records of expenditures on construction, 820, 821; Coal used, 821; Water used, 822; Bonds: authorized, 830; issued, and outstanding, 831, 832; disposal of, 833; funded debts other than, 833; Assets: 836-7; determination of value of, 840; No receipts, 842; Expenses, 843-4, 851; Profit and loss account, 850, 851-5; Organization, 886 ff.; Governing bodies: not salaried, 887; meetings, 888; authority, 888, 889, 890; Chief executive officer and head of engineering service, 889, 890, 891, 892; Employment, 893, 894, 895; Promotions, 894; Political conditions, 895 *et seq.*; conditions of suffrage, 895.

Appraisal: of waterworks, 185-204; gas works, 542; Wheeling gas works in event of competition with natural gas, 565-7; electric works, 771-5; Mass. electric works, 1031 *et seq.*

Appropriations for works: water, 375-6; Philadelphia gas, 1306, 601; Wheeling gas, 572; electric, 817; Mass. electric, 1126.

Area to be served by: water, 32-34; Wheeling gas, 437; gas companies, 445, 446; electric, 688; Mass. electric, 927, 937.

Assessments, political: Syracuse waterworks, 153; Wheeling gas works, 429-30, 490; Philadelphia gas works, 604; Allegheny electric works, 752, 753.

Assessments, special: waterworks, 81-2; Chicago waterworks 357-8; gas companies, 4[illegible]8-9; Mass. electric works, 940.

Assets: Waterworks: Chicago, 392-3; Cleveland, 403-4; Syracuse, 416; Electric works: 836-40; Chicago, 861, 873; Mass., 1145-6 *et seq.*

Atlanta Gas Light Co., Sources for report on legislation, 426; Date of beginning supply, 426; Incorporation, 427; date and place of, 442; under special act, 443; Present character, 427; Ownership changes in, 429; of stock by Georgia Railway and Electric Co., 432; by competing electric company, 433; Sentiment toward, 4[illegible]; Consolidations, 431; Population of city, 432; Supervision: state, 4[illegible]; city, 4[illegible]; exercise of city's powers, 4[illegible]; small right of city of, 463; Charter perpetual, 44[illegible]; power of state to amend, 441; powers, 44[illegible], 446; Charter limitations on area to be served and taxation, 44[illegible]; Taxation: taxes and licenses, 447; of franchise, 447, 449; state, [illegible]; local, [illegible]-7; assessments for local improvements, 456-7; city's power as to, 472; franchise provisions on, 481; history of taxation matters, 481-3; attempts to blackmail company, 482-3; valuation for, 483; returns for, 483, 484; Laws relating to, 447, 448; Issuance of stock and bonds, 449, 473; Compensation for franchise: 449; city's power as to, 472; Hours, 450, 498; Employers' liability, 450; Penalty for black-listing discharged employees, 451; Franchises, powers of city as to: granting, 459-60; alienation, 462; other than charter rights, 463; duration, 466; transfer, 474; renewal, 475; Franchises: procedure for granting, 460-1; transfer, 484-5; no renewal required, 485; deliberation in granting, 488; drafting of, 489; Franchise of Southern Lighting and Power Co., 463-5; Powers of city as to franchises: plant, equipment and extensions, 465; acquisition of plants, 468-9; disposition of plants acquired, 469; beginning and completing construction, 470; monopoly rights, 470; taxation, 472; paving and removal of mains, 472; compensation for franchises, 472; records and audit, 473; labor matters, 474; enforcement of, 475-6; Property owners' consent not required for use of streets, 469; Matters contracted on with city, 471; Franchises in force, 477; Franchise provisions: forfeiture, 478; purchase by city, 478; beginning and completing construction, 479; taxation, 481; street work, 484; removal of mains at city's expense, 484; Rates, 1868-1906, 480; Free service, 484; Employees: 498; negroes, 498; character of, 559; Wages, 498-9, 500; Process of gas making and purifying, 537; Coal gas works, 538; Water gas works, 538; Purifying plant, 539; Holders, 540; Mains: 540; maps of, and fixtures, 555; Meters: 541; tests of, 546; Services: 541; metered, 542, 543; work on, prior to paving, 555, 561; records of, by date, 561; No stoves or appliances rented, 541; Consumption, 543-4, 545, 546; Leakage, 543; Output, 545; Means to extend business, 547; Kind of gas supplied, 547; Air mixed with gas, 547; Candle power, 548, 549; Purity, 549; Tests and experiments, 549; Interruptions of service, 551-2; Pressure, 550, 551; Extensions, 552, 553; Street work, 554; Permits for street openings, 555; Underground structures; location, 555; protection, 560; Purchase of supplies, 555, 556; Plant adequate, 556; condition of plant and equipment, 557; Ventilation, and guarding of machinery, 557; Location of offices, 557; Handling of complaints, 558; Badges and Uniforms, 558; Harmony between departments, 559; Attendance at fires, 559; Reports of operation to manager, 560; Drafting room, 560; Care of tools, 560, 561; Attention to orders to turn on gas, 561; Regulations on entrance of employees in houses, 562; Work in houses, 565.

Attleboro Steam and Electric Co.: see Massachusetts Electric Works.

Audit; waterworks, 47-8, 69, 97, 364-5; gas companies, 473; Wheeling gas works, 569; electric works, 692-3, 714, 737-9, 807; Mass. electric works, 1117-18.

Austin water system: acquisition by Chicago, 324-5.

Badges and uniforms of employees: water, 271; gas, 558-9; electric, 796; Mass. electric, 976, 1094.

Baldwin, Simeon E.: opinion on liability of New Haven Water Co. for property destroyed by fire; views on purchase by city of New Haven Water Co., 125-6, 128.

Barrett, J. P.: career as Manager of Chicago Electric Works, 666, 668-71.

Baxter, Isaac C.: report on cost of new plant for Wheeling gas works, 486-7.

Bemis, Edward W.: explanation of failure in 1904 of Cleveland waterworks to make customary increase in earnings, 12; questions on waterworks prepared by, 277 ff.

Beverly Gas and Electric Co.: see Massachusetts Electric Works.

Bibliography on Philadelphia Gas Works, 664.

Bills: Payment of, by works; water, 262; gas, 556; electric, 792; Mass. electric, 1088-9; Collection of, by works: water, 361-3; Wheeling gas, 569; electric, 806; Mass. electric, 1116-17.

Blacklisting of discharged employees by gas works forbidden, 451.

Bonds: see also Liabilities; Issuance of, by works: water, 17-20, 45, 68-9, 96-7; 384-92; Syracuse water, 29; Wheeling gas, 433, 576; gas companies, 449, 472-3; electric, 690-1, 714, 829-35; Mass. electric, 930, 937, 938, 1135-9; Provision for paying, by works: water, 376; electric, 818; Mass. electric, 1126.

Breaks in mains of waterworks: in 1905, 293-6; Indianapolis, 307-8; Chicago, 322-3.

Brightwood (Indianapolis) Ind. municipal waterworks: 10; financial matters, 14.

Burnett, Frederick: reports of, Engineering matters, gas works, 537 ff.; Appraisal of Wheeling gas works, 567.

By-products: Wheeling gas works, 574-5.

Candle power of gas: 548-9.

Central City Water Co. (Syracuse): seeking of franchise by, 3; franchise granted and organization, 4; history, 6.

Charters of companies: water, 60-64; gas, 443-6; City Gas Light Co. of Norfolk, 467-8; Mass. electric, 937-8.

Chicago Arc Light and Power Co.: consolidations with other companies, 676.

Chicago Edison Company (electric): Wages: compared with municipal electric works, 146; workmen and, 902-3; Welfare conditions excellent, 147; Consolidations with other companies, 676; Present status, 678-9; Franchise: date granted, by what authority, duration, competitive, area to be served, 721; Franchise provisions: forfeiture, 724; property owners' consent, period of completing construction, 729; rates, 729; service, 732; right of city to regulate, 735; paving, 739; enforcement of, 745; workmen and hours, 900-1.

Chicago City Hydraulic Co.: history of, 8-9.

Chicago Hydraulic Co.: history of, 7-8.

Chicago municipal electric works: Labor and Politics, see Chicago Municipal Waterworks, 136 ff.; Civil Service: relations to, 136 ff.; temporary appointments on permits under, 137-8; results of examinations, 139; no material violations of law relating to, 142; positions controlled by, 143-4; Unions: 139; agreement of city electrician with Electrical Workers' Union, 139-40; Superintendent of, no power to discharge men, 141-2; Employment by companies on recommendation of politicians, 142-3; Wages: method of fixing, 144; compared with companies, 144-6; statutory provisions on, 691; paid, 899; Date of beginning supply, 665; Early history, 665-6; Present and original organization, 666;

Changes in management, [illegible]-72; Sentiment toward, [illegible]; Competition with [illegible], [illegible]; gas works, [illegible]; Consolidation of companies, 676-7. [illegible] of present companies, 678-9. Population of city and area served, 679, [illegible]; Powers of city: construction, purchase, operation and condemnation of works, [illegible]; to tax for works, 681, [illegible]; to incur debt, [illegible]; Procedure to construct or acquire works, 683-4. Statutory provisions: condemnation of works, [illegible]; area to be served, 688, charges, [illegible]; doing work by contract or direct labor, [illegible], letting contracts, [illegible]; sinking funds, [illegible]. Bonds: issuance of, [illegible]; authorized, 830-1. Audit, [illegible]; Publication of reports, 693; [illegible]; Pensions, [illegible]. Laws relating to electric supply, [illegible]; Franchises, city's power to grant, [illegible], 699, procedure for granting, [illegible]; city's power as to alteration of, 701; publicity and deliberation in granting, [illegible], scandal in granting, 747, drafting of, 748. Powers of city as to franchise clauses: streets to be used, [illegible]; nature of plant and equipment, 707, extensions and improvements, 707, duration and forfeiture, 707, disposal of works, [illegible]; property owners' consent, [illegible]; beginning and completing construction, [illegible]; monopoly rights, 710; rates and service, [illegible]; regulation by city, [illegible]; taxation, [illegible]-11; compensation for franchises, 712; paving, 712, removal of [illegible], 713; issuance of stock and bonds, 714; publicity of records, 714, transfer of franchises, 714; revocation, [illegible]; means for enforcement of, 715-16, [illegible]. Franchises in force: date granted, by what authority, duration, exclusive or competitive, mileage of streets granted, 719-22. Franchise provisions: forfeiture, acquisition by city, how to be utilized after acquisition, [illegible]; property owners' consent, period for beginning and completing construction, and rates, [illegible]; service, [illegible]; plant and equipment, regulation of operation, taxation, and compensation for franchises, [illegible]; paving, removing of wires, and audit, [illegible]; transfer of franchises, [illegible]; street work and special provisions, [illegible]; enforcement of, [illegible]-6. [illegible] covered by investigation, 759, [illegible]; Boilers, [illegible]; Steam engines, [illegible]; Auxiliary apparatus, 761; Dynamos, [illegible]; [illegible] transformers, [illegible]; Lines: underground, [illegible], overhead, [illegible]. Lamps, [illegible], number and charge for, [illegible]; ownership of posts, [illegible]; Meters and [illegible], [illegible]; tests of [illegible]; [illegible]; Owns all [illegible] used, [illegible]. Current regulation, [illegible]; Voltages, [illegible]; [illegible] of, [illegible]; Interruptions of, [illegible]; [illegible]; Extensions, [illegible]; Street work done by direct employment, [illegible]; permits for, [illegible]; Care of trenches, [illegible]; [illegible] of [illegible] in paving, [illegible]; maps of, [illegible]; Underground structures, [illegible]; protection, [illegible]; Purchase of materials, [illegible]; Condition of plant and equipment, [illegible]; Ventilation and guarding of machinery, [illegible]; [illegible]; Employees: character of, [illegible]; number of, [illegible]; Hours, [illegible]; [illegible]; Attendance at [illegible]; Reports of operation to manager, [illegible]; No drafting room, [illegible]; Tests, [illegible]; Organization, [illegible]; Accounts, keeping of, 806-7, 808, 809; expenses not charged, 811; credits not made, 811-12, storeroom account, 813, 814; items omitted from financial statement, 819, poor system of, in early years, 872-3, Audit, 807; Wires on poles of companies, 811-12; Free service, 812, 813, Meeting of deficits, 814, Interest rate compared with companies, 815-16; Appropriations for, 817; Records of expenditures on construction, 820, 821; Coal used, 821; Water used; 822; 1888-1904, 867-8, 884; Contracts for public lighting, 822-7; Payments to city by street railways, 831, 835; Liabilities: provision for payment of, 834; present, 841, 861, 873; Assets, 837-8, 864, 873, determination of value of, 840; Receipts: 842; 1888-1905, 874-7; Expenses: 844-6, 851-2, 1888-1905, 874-7; Profit and loss account, 850, 855-7; Report on financial affairs, 1887-1905, 863 ff., Cost of land, construction of plants and extensions, 1887-1905, 865-6, 878, Determination of amounts to be charged for taxes, insurance, depreciation, water used, etc., 867-9, Cost of rented lights and current purchased, 1888-1905, 869-70, 879-80, Cost of operations: 866-7; compared with cost if lamps had been rented, 870-2, 881, 883 Interest at 4% on cost of construction, operations less depreciation, and cost if rented, 882; Organization, 886 *et seq.*; Governing body: salary, 887; meetings, 888; authority, 888, 889, 890; Chief executive officer and head of engineering service, 890, 891, 892; Salaried officers, 892, 893; Employment, 893, 894, 895; Promotions, 894; Political conditions, 895 *et seq.*; Conditions of suffrage, 895; Employee voters, 896.

Chicago municipal waterworks: see also Rogers Park Water Co.; Date of beginning supply 1; original and present character, 1, 2, 7; Changes in ownership, 7-9, 10, Sentiment toward, 11, 13; Pressures: too low, 11, 167, measuring of, 229, 322; at works, 209, 210, hydrants, 240, 245; mains, 241, tests of, by National Board of Fire Underwriters, 241-3; uniformity of, 241, maximum and minimum, 244, 245; complaints as to, 245, Water: unsanitary condition, 11; not filtered, 264; quality of, 217, 222; Competing water companies, 13, Purchase of part of plant of Chicago Suburban Water and Light Co., 14-15, 324-5; Waterworks in annexed territory, 14; Park pumping stations, 15, Population of city, 16, Powers of city as to waterworks: construction, 16, eminent domain, 17, 21, taxation and raising money, 17-19, general taxing power, 20-21, debt limits, 22-23, purchase, 31, to fix charges and tax for expenses, 58-9, Procedure for construction and acquisition, 21-6, No taxes or fees paid, 30; Area to be served, 22-3, Statutory provisions: extensions and improvements, 24, Strikes, 64; Rates: statutory provisions on, [illegible], charged, 279, 353-5, 356, for public uses, 292, enforcement of, [illegible], for extensions, 357-8, repairs to meters, [illegible], connections, 359, meters, [illegible], Service: statutory provisions on, 42, Interruptions of, 246, Public work: done by contract or direct employment, 43-[illegible], letting of contracts for, 44, Issue of bonds, 4[illegible], Use of income, 45, Sinking funds, 46, 276, Audit, 47, 364, 365, Reports: publication, 48-9, to state, 58; Salaries: fixing of, 49, of governing body, [illegible], chief executive officers, 192, salaried officers, 893; Wages: fixing of, 52; a lien on payments due contractors, 55; paid, 897-9; Hours, 53, 897; Pensions, 53-4; Employees; citizenship of, 55; character of, 271; union men, 139; number of, 897-9; Laws for municipal and private works different, 55-6; Analyses: 58; chemical and bacteriological, 216-18, 219, 220-1; Powers of city as to franchises: granting, 82-3; alienation, 87; streets to be used, 88; plant and equipment, extensions, improvements, 89; duration and forfeiture, 89; purchase of private works, 90; disposition of plants acquired, 91; beginning and completing construction, 92, 93; monopoly rights, 93; rates, 93-4; service and operation, 94; taxation, 95; compensation for franchises, 95; paving, and removal of mains, 96; issuance of stocks and bonds, 95; audit and reports, 97; transfer, 97; labor matters, 98; renewal, 98; enforcement of provisions, 99, 100-1; Possession taken of Rogers Park Water Co., 100-1; Franchises: in force, 102; deliberation, publicity and scandal in granting, 117-18, 119, 120; drafting of, 120; Civil Service: 136-144; Superintendent, no power to discharge employees, 141-2; Sources of supply: 159; amount supplied by each, 164; sanitary inspection of, 207; Supply: maximum and minimum, 165; insufficient, 166-7; means for improving, 167-8; Improvements contemplated, 168-70; Consumption: in 1904, 169-70; yearly and daily, 179, 224; metered water sold, 224; Distribution, 171; Reservoirs: capacity, 172; storage in, 174, 179; Pumps: daily capacity, 172; daily and yearly pumpage, 175, 297, 298; static head, 175; dynamic head, 176-7; foot-gallons per 24 hours, 177; and engines, 260-1; Mains: kind of pipe, 179; length, 182, 183; diameter, 183, 184; laid from revenue, special assessments, and deposits, 248-249; to secure circulation and pressure, 249; breaks and leaks, 294, 322-3; distribution system of, 318-19; Valves: 184, 321-2; prices paid for, compared with companies, 194-5; Service pipes: kind and length, 184; run prior to paving, 274; in use, 320; Services: metered and unmetered, 223-4; improvement of, prior to paving, 255; records of, by date, 274; Appraisal: land, 185, plant, 186-7; cribs, 185, 188; tunnels, 188-9; buildings, 189; pumping stations and equipment, 189-90; mains, 191-3; hydrants and valves, 193-6; fire cisterns, 197; Pavement data, 191-2; Hydrants: prices paid for, compared with companies, 194-5; in use, 225, 296, 320-1; Drainage canal, 205-6; No settling basins, 205; Typhoid fever, 223, 259-60; Meters: 223; services which must be metered, 224; tests of, 225, 277; Extensions: factors determining, 247; adequate, 251; policy as to 251, 252, 253; power as to, 253; cost of, 291; Street work: done by contract and direct employment, 254; water used in puddling ditches, 255; permits for, 256 257; Care of trenches, 255; Maps, 255; Underground structures: location, 256; protection, 272; Purchase of supplies: 257, 258, 259-61, 262; Tunnels: 260; and cribs, 317; Plant and equipment: modernity and efficiency of, 262-4; necessary repairs, 267; care of, 269; Pumping stations, 262-4, 318; Offices conveniently located, 269; Handling of complaints, 269, 270; Badges, 271; Harmony between dep'ts, 271; Telephones, 271; Night guards at works, 272; Attendance at fires, 272; Drafting room, 273; Tools, 273; Attention to orders to turn on water, 273-4; Work in houses, 275, 276, 277; Fire insurance: rates, 278, 279; extra cost of, because of waterworks deficiencies, 279; estimated cost of, on plant, 281; Cost of a comparable unit of service, 278-81; Inferiority of water: consumption of other than city water because of, 279, 290, 301; damages resulting from sickness because of, 279; Damages by failure of supply, 279; Taxes lost because of municipal works, 280-1; Description of city, 314-15; History of water supply, 315-17; Work done in 1905, 323-4; Removal of pipe under track elevation, 325; Recommendations of Sup't of Water Pipe Extension for 1906, 325-6; Collection of bills, 361, 362; Accounts: system of, 363; charging of items to proper, 365; kept separate from city's, 366; expenses not charged, 366, 367; credits not made, 368; entering of free service, 371; charging of materials, 372; charges for taxes, insurance, depreciation, lights, 376-8; Free service, 368, 370, 371, 896, 897; Interest rate compared with companies, 372-3; Appropriations for, 375, 376; Liabilities: cancelled, 376; bond issues, 384-6; funded debts other than bonds, 386; provision for payment of, and interest, 386-7; present, 394; Records of expenditures on construction, 383; Coal used, 383; Assets, 392-3; Receipts, 394; Expenses, 394-6; Profit and loss account, 396-7, 399, 401-2; Surplus account, 396, 397, 398, 400; Organization, 886 *et seq.;* Governing body: meetings, 888; authority, 888, 889, 890; Chief executive officer and head of engineering service, 889, 890, 891, 892; Employment, 893, 894, 895; Promotions, 894; Political conditions, 895 *et seq.;* Suffrage, 895; Employee voters, 896.

Chicago Suburban Water and Light Co.: plant in Austin, Ill., purchased by Chicago, 14-15.

Chicopee municipal electric works: see Massachusetts Electric Works.

Cities, supervision by, of works: water, 16 ff.; gas, 433 ff.; electric, 679; Mass. electric, 922 ff.; see also works located in the various cities by name.

Citizens' Gas Co. (Wheeling): franchise of, 476.

Citizenship of employees of works: water, 55, 71; gas, 441, 450-1; electric, 695-6.

City Gas Light Co. of Norfolk: charter amendments and consolidations, 428; consolidation with Norfolk Gas and Electric Co., 431.

Civil Service: Syracuse waterworks, 50-2, 153-5; Chicago electric and waterworks, 136-144.

Clark, Walton: report on Philadelphia gas works, 1887-1906, 500 ff.

Cleveland municipal waterworks: Date of beginning supply, 1; Character of organization: original, 1, 2; present, 7; Sentiment toward, 11; Sentiment toward management, 11-12, 13; Audit, 12, 47-8, 361-5; Population of city, 16; Powers of city: construction, 16; eminent domain, 17, 32; raising money, 19; taxation, 19, 21-22, 59; debt, 22, 23; purchase, 31; Procedure for construction or acquisition, 26-9; No taxes or fees paid, 30; Area served, 33-4; Statutory provisions: extensions and improvements, 35; service, 42; doing work by contract or direct employment, 43-4; strikes, 54-5; citizenship of employees, 55; Rates: statutory provisions on, 36;

power to fix [illegible], charged, 281, 285-6, for public uses, [illegible], enforcement of, 337, for [illegible], [illegible], changes in, 190[illegible]-6 [illegible]. Revenue legally a separate fund, [illegible]. Letting of contracts, 41-5. Bonds: issue of, [illegible], provision for payment, [illegible], issued, [illegible]. Use of income, [illegible]. Sinking funds, 46. Reports: publication of, 44, to state, [illegible]. Salaries: statutory provisions on, 49-50, system of [illegible], [illegible], of governing body [illegible], chief executive officer, 892. Wages: fixing of, [illegible], paid, [illegible]; Hours, [illegible], 9[illegible]. Pensions, 54. Typhoid fever, 57, 210, 221, [illegible]; supervision by state, 56, 57. Powers of city as to franchises, granting, 82-[illegible], alienation, 87, methods of disposing of, [illegible]. Powers of city as to franchises: [illegible] streets to be used, 88-9, 92, plant and equipment, extensions and improvements, [illegible], duration, 89, forfeiture, [illegible], purchase by city, 90-1, disposition of plants purchased by city, 91; regulation by city, 92, period for completion of works, 93, monopoly rights, 93, rates, 94, service and operation, 94; taxation, [illegible], compensation for franchises, [illegible], paving, and removal of snow, [illegible], issuance of stock and bonds, [illegible], audit and reports, 97, transfer of franchises, 97, labor matters, 98, renewal, [illegible]. Power of city to enforce franchise provisions, 99. Franchises no water in force in city, 1[illegible], deliberation in granting, 11[illegible], publicity in granting, 12[illegible], drafting of, 1[illegible]. Organization of dep't, 14[illegible], [illegible] ff. Approval of budgets by council, 148. Political activity of corporations, 148, promise of mayor to take out of politics, 148, political attacks on management, 149. Control of dep't over employment, 148. Unions: policy of dep't toward, 149, difficulties with, 1[illegible], question of closed shop not raised, 1[illegible]. Welfare conditions, 149. Supply: sources for, 1[illegible], amount of, by pumping stations, 164, average, 165, [illegible] for sufficient, 17[illegible], sanitary [illegible], [illegible]. Method of distribution, 171. Reservoirs: capacity, 172, storage in, 17[illegible]. Pumping stations, 17[illegible]. [illegible]. Pumps: [illegible], 17[illegible], dynamic head, 177, [illegible] gallons per 24 hours, 177, 178. Consumption, [illegible]. Mains: kind of pipe used, 17[illegible], length, 1[illegible], diameter, [illegible]. Gate valves, [illegible]. Services: kind of pipe used, 1[illegible], work on prior to paving, [illegible], records of by date, [illegible]. Appraisal: plant, 1[illegible], land, 1[illegible], engines, [illegible]. Increase in pipe, valves and hydrants in 190[illegible], 1[illegible]. Pavement data, [illegible]. Meters, 2[illegible], [illegible], services metered and unmetered, [illegible], advisability of installation of, [illegible], optional use of, [illegible], tests of, [illegible], charges for repairs, [illegible], charges for [illegible], [illegible]. Water, not filter[illegible] [illegible] cuts of trenches, 255; Maps, 256; Underground structures: locating, 256; protecting, 272. Purchase of supplies, 257, 258, 259, 261, 262. Plant and equipment: condition of 262, 261, necessary repairs, 267-8, care of, 269. Offices conveniently located, 269. Handling of complaints, 269, 270. Badges, 271; Employees: morale and discipline of, 271; number of, 9[illegible]8; Harmony between dep'ts, 271; Telephones, 271. Works and offices guarded at night, 272. No attendance at fires, 272; Drafting room, 273; Tools, 273; Attention to orders to turn on water, 274; Work in houses, 275, 276, 277; Fire insurance rates: 281; extra, because of waterworks deficiencies, 281-2; Cost of a comparable unit of service, 281-3; Consumption of other than city water, 282, 290-1, 301; Damages because of inferior water, 282; Taxes lost to city because of municipal works, 283; Work done by repair dep't in 1905, 294-6. Description of city, 326; History of water supply, 327-33. Cribs and tunnels, 333-5; Collection of bills, 361, 362, 363; Accounts system of, 363-4; charging items to proper, 365; kept separate from city's, 366; expenses not charged, 366, 367; credits not made, 368; free service not entered in, 371; charging of materials, 372; Free service, 368-9, 370-1, 896, 897. Interest rate compared with companies, 373-4; Appropriations for plant, 375, 376. Liabilities: cancelled, 376; present, 401. Charges for taxes, insurance, depreciation, maintenance, etc., 378-81; Records of construction work, 383; Coal used, 383. Assets, 403-4; Receipts, 404-5, 414-15; Expenses, 405-6, 411-15; Profit and loss account, 407, 410-11, 414-15; Surplus account, 408-9, 411-13; Governing body, meetings, 888; authority, 888, 889, 890. Chief executive officer and head of engineering service, 889, 890, 891, 892. Employment, 893, 894, 895; Promotions, 894. Political conditions, 895 *et seq.*; conditions of suffrage, 895; employee voters, 896.

Cleveland Water Co.: history, 1-2; incorporation, 327.

Coal used by works: water, 298-301, 383. Wheeling gas, 574; excessive price paid for, by Philadelphia gas trustees, 593. electric, 821. Mass. electric, 1128-9.

Commons, John R., reports on Labor and Politics in works: water, 136 ff.; gas, 490 ff.; electric, 749 ff.; supplementary, 885 ff.

Commonwealth Electric Co. (Chicago) Wages compared with municipal, 116; paid, 964-5. Welfare conditions excellent, 147. Franchise grant to, 676, date of, by what authority granted, duration, competitive, territory to be served, 721. Present status, 678-9. Franchise provisions: purchase by city, 721, property owners' consent, period of completing construction and rates, 729; service, 772; regulation by city, and compensation for franchise, 736; paving and examination of records, 739; street work, 741; no enforcement of by city, 745. Employees and hours, 961, 964-5.

Competition between works: water, 13-14, gas, 4[illegible]-2, electric, 67[illegible]-6. Mass. electric, 918; Mass. gas and electric, 921-2. Powers of cities as to: water, 93, gas, 47[illegible]; electric, 710.

Complaints: On pressure and service of waterworks, 21-6. Handling of, by works: water, 269-70; Philadelphia gas, [illegible]; gas, [illegible]; electric, 7[illegible]-6. Mass. electric, 1[illegible]

Connecticut Railway and Lighting Co. in South Norwalk: Sale to city of electrical apparatus, 672; Consolidations, 678; Present status, 679; Difficulty in securing permit to use streets, 705-6; Period within which construction was to be begun by companies absorbed, 709; Taxation of, 712; Charter: duration, competitive, territory to be served, 723; Franchise provisions: forfeiture, 726; acquirement by city, 726-7; supervision by city of service, 734; right of city to regulate operation, and of taxation, 737; reports, and transfer of franchises, 742; enforcement of city's right of regulation, 745, 746.

Connections, charge for, by works: water, 359; Wheeling gas, no, 568; electric, 804; Mass. electric, 1108.

Consolidations of companies: water, 14-15; Norfolk gas, 428; gas, 431-2; electric, 676-8; Mass. electric, 918-19.

Consumer: dealing with, by Philadelphia gas works, 531-4.

Consumption: Water: 179, 223-239; Cleveland, 225-30; Syracuse, 230-2; Indianapolis, 232-6; New Haven, 236-9; other than city, 301-2, 306; Gas: 542-6; Electricity: 775-9; Mass. electricity, 1032 *et seq.*, 1062-4, 1212, 1213.

Contracts: Letting of, by works: water, 24, 25-6, 27, 29, 30, 44-5; Wheeling gas, 438-9; electric, 690; Statutory provisions on doing public work by: waterworks, 42-4; Wheeling gas works, 438-9; electric works, 689-90; Mass. electric works, 1081-2; Provisions in, giving workmen and furnishers of material in Chicago lien on payment due contractors, 55; Between New Haven Water Co. and the city, 123-4, 128-9, 130; Street work of waterworks done by, 254; Advertising of, for materials by works; water, 257-8; gas, 555; electric, 789; Mass. electric, 1086; For public lighting: electric works, 822-7; Detroit electric works, 861-3; Mass. electric works, 1130-1.

Cosmopolitan Electric Co. (Chicago): securing of franchise by, 676-7; franchise provisions, 722 *et seq.*

Council: Relation to works: Wheeling gas, 490, 491, 492-3; Philadelphia gas, 502, 507-9.

Cribs, water; Chicago, 317; Cleveland, 333-5.

Daggett, David, Sec'y of New Haven Water Co.: History of New Haven Water Co. by, 346-9; Administration of New Haven Water Co. by, 349-52.

Danvers municipal electric works: see Massachusetts Electric Works.

Debt, powers of cities to incur, for works: water, 22-24; Wheeling gas, 434; electric, 682-3; Mass. electric, 922.

Deficit: Of Philadelphia gas works, 1881-87, 596; Meeting of, by works: electric, 814; Mass. electric, 1124.

Depreciation: statutory provisions on works; water, 69; Wheeling gas, 440; electric, 691; Mass. electric, 931-2; On Chicago water cribs and tunnels, 188-9; Charge for, on works: water, 377, 380, 382; Wheeling gas, 572; electric, 800-2, 809, 810; Omitted from accounts of electric works, 818, 819, 820; Determination of, as a charge against Chicago electric works, 867; Order of Mass. Gas and Electric Light Commissioners on provision for, by Holyoke gas and electric works, 934-5.

Detroit municipal electric works: Date of beginning supply, 665; Original and present character, 666-7; Sentiment toward, 673, 674, 675; Competition: with electric companies, 675, 676; with gas works, 679; Consolidations of companies, 677-8; Population of city, 679, 780; Powers of city: construction, purchase, operation, and condemnation of works, 680-1; to tax, 681, 682; to incur debt, 683; to tax for expenses, 697; Procedure to construct or acquire works, 684-6; Statutory provisions: purchase, 687; area to be served, 688; nature of plant and equipment, 688; extensions and improvements, 688; strikes, 695; citizenship of employees, 695-6; Right of eminent domain, 688; Charges: 689; power as to, 697; for connections, 804; no, for renewals, 804; Contracts: doing work by, 690; Depreciation: policy as to, 691; report on, 800-2; Bonds: issuance of, 690-1; provision for paying, 818; authorized, 830, 831; issued and outstanding, 831, 832; disposal of, 833; Use of income, 691; Sinking funds, 692; Audit: 693, 807; Publication of reports, 693; Wages: statutory provisions on, 694; policy of Electrical Workers' Union as to, 756; paid, 756-8, 906-7; overtime, free service, holidays, pensions, and sick-pay, 758; compared with private companies, 758; Salaries: statutory provisions on, 694; of chief executive officer, 892; Hours, 694-5, 756-8, 906; Power of city as to franchises: to grant, 698, 699-700; alienation, 701-2; Franchise granting: procedure, 700-1; deliberation and publicity, 747; scandal, 747; Drafting of franchises, 748; Power of city as to franchise clauses: streets to be used, 703-5; nature of plant and equipment, 707; extensions and improvements, 707; duration and forfeiture, 707; acquisition and disposal of works by city, 707, 708; time of beginning and completing construction, 709; monopoly rights, 710; rates and service, 710; regulation by city, 710; taxation, 711; compensation for franchises, and paving, 712; removal of mains, 713; issuance of stock and bonds, audit, publicity of records, and transfer of franchises, 714; renewal, 715; Enforcement of franchise provisions, 716; Public Lighting Commission: supervision of companies, 716-17; power to grant franchises, 717-18; Franchises in force, date granted, by what authority, duration, exclusive or competitive, territory to be served, 723; Franchise provisions: forfeiture, 726; operation of works acquired by city, 727; no, on rates, property owner's consent, or time of beginning and completing construction, 730; service, 734; regulation by city, 737; paving, and placing wires underground, 737; transfer of franchises, 742; labor matters, and renewal of franchises, 743-4; enforcement of, 745, 746; Labor and Politics, 754 ff.; Management 754-5; Offices of Secretary and General Sup't, 755; Strike of trimmers, 755; Open shop, 755; Present Superintendent and Ass't Sup't, 756; Employment, 756, 893, 894, 895; Political assessments not paid by employees, 756; Work of trimmers in public and private works compared, 757; Year covered by investigation, 759, 803; Boilers, 759; Steam engines, 760; Auxiliary apparatus, 762; Dynamos, 763-4; Transformers: station, 765; line, 771; Lines: underground, 766; overhead, 767; Lamps: arc, 769, 777; incandescent, 770, 778; lamp hours, 827; number, and charge for, 828; ownership of posts, 829; Motors, 770; Meters: 770; payment for repairs to, 804. Arc light regulators 773. Appraisal 773-4. Services: 776, usage of 788. Output and consumption 776-7. Area served and paved streets, 778. Conduits rented 779, 780. Service character of 781 et seq.; hours of, 783, interruptions of, 784. Means to extend business, 781. Current regulation, 781-2. [illegible], 782, 787. Voltage, 783. Extensions, 784, [illegible], 787, payment of cost of, [illegible]. Street work done by direct employment 787; permits for, 788, [illegible]. Care of [illegible] 788. Underground structures, locating, 788; protecting, 798; Purchase of supplies, [illegible], 791, 792. Condition of plant and equipment, 792, [illegible]. Ventilation and guarding of machinery, [illegible]; Badges, 796. Employees, character of, 796, 797, number of, [illegible]. Harmony between dep'ts, 797; [illegible], 797. Attendance at fires, 797; Reports of operation to manager, 798; Drafting room, 799. Care of tools, 799. Collection of bills [illegible]. Accounts system of, [illegible]; charging of particular [illegible]; all expenses charged, 810. [illegible] account, 813. Items omitted from financial statement, 819-20; Free service, [illegible]. Meeting of [illegible], 814. Interest rate compared with companies, 816-17. Appropriations for, 817. Liabilities cancelled 818, provision for payment of, [illegible]; present, 841; [illegible] of expenditures on construction, [illegible]. Coal and water used, 821, 822; [illegible], determination of value of, [illegible]. Expenses, 846-7, 852-3. Profit and loss account, [illegible], 857-9. Contracts for public lighting, 861-3. Rates for contracts on poles, use of track and conduits, [illegible]. Organization, 886 ff. Governing body: members, [illegible], authority, 893; Chief executive officer and head of engineering service, [illegible], 891, 892. Salaried officers, [illegible]. Promotions, 894. Political conditions, [illegible] et seq.; conditions of suffrage, [illegible], employee voters, 896.

Direct employment, public work done by, for works: water, [illegible]; gas, 428-9, [illegible]; electric, 787; Mass. electric, 1081-2.

Distribution systems of works: water, [illegible]; Philadelphia gas, [illegible]; gas, [illegible]; electric, [illegible]-71; Mass. electric, [illegible].

Dividends: statutory provisions on, for waterworks, [illegible].

Drafting rooms of works: water, 272; gas, [illegible]; electric, 799; Mass. electric, 1097.

Duration of rights of companies: water, [illegible]; gas, [illegible]; electric, 718; Mass. electric, [illegible].

Dynamos of works: electric, 762-4; Mass. electric, [illegible].

Edison Illuminating Co. (Detroit): Competition with other companies, 677-8; Franchise: date granted, by what authority, duration, competitive territory to be served, [illegible]; Franchise provisions, [illegible]; regulation by city, [illegible]; transfer of franchises, [illegible]; labor matters, [illegible]; enforcement of, [illegible]. Rates of [illegible] compared with public plant, [illegible]. Wages compared with public plant, [illegible].

Electric works: see also individual plants; Advisability of combining with gas works, [illegible]; Reports: Historical and General, [illegible]; [illegible]; Public Ownership of Mass. electric companies, [illegible]; Franchises, [illegible]; Labor and Political, [illegible]; 946 ff.; Engineering Matters, 759 ff., 985 ff.; Financial Matters, 803 ff., 1101 ff.

Electrical Workers' Union: policy as to wages in Detroit electric works, 756.

Electrolysis in New Haven: 289.

Ellicott, Edward B.: career as Manager of Chicago electric works, 671-2.

Eminent domain, right of cities as to plants: water, 17, 31-2; gas, 437; electric, 680-1, 687-8; Mass. electric, 922.

Employees of works: Indianapolis water, 157, Wheeling gas, 495; Atlanta gas, 498; Philadelphia gas, relation to economy in manufacture, 511-13; comfort of employees, 517-18; number of employees, 1897, 1905, 1906, 535-6; Electric, 749-50, 753, 796-7; All, 897-908; Mass. electric, 965-71, 981, 1094-5.

Employers' liability; waterworks, 70-1; gas works, 450.

Enforcement of statutory and franchise provisions of companies: water, 99-102; gas, 451-2, 475-6; electric, 715-18, 745, 746.

Engineering matters, reports on, in works: water, 159 ff.; gas, 537 ff.; electric, 759 ff.; Mass. electric, 985 ff.

Ericson, John, City Engineer of Chicago: report on improvements to be made in Chicago waterworks, 168-70.

Expenses of works: Chicago water, 394-6, 401-2; Cleveland water, 405-6, 414-15; Syracuse water, 417-19, 424-5; Wheeling gas, 580-2; Philadelphia gas, 1887-97, 609, electric, 843-9, 851-3; Chicago electric, 1888-1905, 874-7; Mass. electric, 1147-8 et seq.; Mass. electric, per kwh., 1212, 1213.

Extensions: Statutory provisions on, of works: water, 34-5; Norfolk gas, 448, gas, 465; Mass. electric, 928; Of works: water, 247-51, 291; Indianapolis water, 306; gas, 552-4; electric, 784-7; Mass. electric, 1075-81; Charge for, by works: water, 357-8; electric, 804; Mass. electric, 1107-8.

Fair Haven Water Co. (New Haven): history of, 14.

Fentress, R. R.: attempt to secure franchise in Norfolk, 474-5, 488, 489.

Filters: attempt by state board to force use of, in Cleveland, 57; of Indianapolis Water Co., 265-6; of New Haven water co., 266-7.

Financial matters, reports on, in works: water, 353 ff.; Wheeling gas, 568 ff.; electric, 803 ff.; Mass. electric, 1101 ff.

Fires, attendance at, by employees: water, 272; gas, 559, electric, 797, Mass. electric, 1096.

Fitchburg Gas and Electric Co.: see Massachusetts Electric Works.

Forstall, Alfred E., reports of: Engineering Matters, gas works, 537 ff.; Appraisal of Wheeling gas works, [illegible] ff.

Fox, W. L., Secretary of Chicago Edison Co.: statement on appointment of men recommended by aldermen, 113.

Franchises: Water: compensation for, [illegible]; power of cities to grant, 82; procedure for granting, 82-7; power of cities as to, 87 ff.; in force, and provisions of, [illegible] ff.; granting of, 117 [illegible]. Gas: compensation for, [illegible]; taxation of, [illegible]; in force, [illegible] ff.; granting of, [illegible]-9. Electric: powers of cities as to, [illegible] ff.; in force, and provisions of, 714 ff.; granting of, [illegible].

Free service by works: water, 15, [illegible]; gas, [illegible]; Wheeling gas, [illegible]; Detroit electric, to employees, [illegible]; electric, [illegible], 806; Mass. electric, [illegible], 1123-?.

Fyffe, C. H.: statement on taxing power of Chicago, 21.

Gardner Electric Light Co.: see Massachusetts Electric Works.

Gartley, W. H.: statement as to employment by United Gas Improvement Co. of men recommended by councilmen, 520-2.

Gas and Electric Light Commissioners, Massachusetts Board of: supervision of electric works, 923, 938; orders relative to selling of electricity below statutory cost by electric works, 932-4.

Gas Works: History and Legislation, 426 ff.; public supervision of, 433-42, 442-59; franchise matters, 459-89; Labor and Politics, 490 ff., 885 ff.; Philadelphia, Labor and Politics, 500 ff.; Engineering Matters, 537 ff.; Financial Matters, 568 ff.; Relation of City of Philadelphia to, 588 ff.; competing with electric works, 679; competing with Mass. electric works, 921-2.

Gate City Gas Light Co. (Atlanta): charter, history, and sale to United Gas Improvement Co., 431.

Georgia Railway and Electric Co.: ownership of stock of Atlanta gas co., 432.

Goodnow, Frank J.: extract from letter of, to experts, 277-8.

Gray, John., reports by: History and Legislation of works: water, 1 ff.; gas, 426 ff.; electric, 665 ff.; Supplementary report on New Haven Water Co., 120 ff.

Hard, William: report on History and Legislation of Chicago electric works, 665 *et seq.*

Helme, William H.: contract to furnish gas to Atlanta, 481.

History and Legislation, reports on, of works: water, 1 ff.; gas, 426 ff.; electric, 665 ff.; Mass. electric, 919 ff.

Holidays: see Vacations.

Holyoke municipal electric works: see Massachusetts Electric Works.

Hours of employees of works: water, 53, 56, 70; Wheeling gas, 441; Atlanta gas, 450, 498, 500; Norfolk gas, 450; Richmond gas, 500; Philadelphia gas, 509, 535-6; Electric: 694-5; Allegheny, 754; Detroit, 756; Water, gas and electric, 897-901, 906-8; Mass. electric, 971-3; Attempt of employees of Salem, Mass., electric works to secure shorter, 980.

Hydrants of waterworks: Chicago, 225, 320-1; Cleveland, 230; Syracuse, 232; Indianapolis, 236, 308; New Haven, 239; Used, and put in in 1905, all works, 296-7.

Income, use of, by works: water, 45; Wheeling gas, 439-40; electric, 691; Mass. electric, 930-1.

Incorporation of companies: water, 60; gas, 442-3; Mass. electric, 936-7.

Indianapolis Water Co.: see also Brightwood Waterworks: Date of beginning supply, 1; Original and present character, 7; Changes in ownership, 9, 10, Early history, 9, 10, 340-3; Competition: with private wells, 10, 303; with water companies, 14; Sentiment toward, 12, 13; Population of city, 16; Incorporation, 60; Charter: duration, 60; powers, 60-2; No fees paid, 64, 81; Public supervision, 64, 72, 73, 74; Laws relating to, 65-6, 67; Powers of city: 65, to prevent pollution, 66; to purchase, 66; Powers of Board of Public Works, 65, 66; Area to be served, 67; Statutory provisions: depreciation, 69; profits and dividends, 69; enforcement of, 72; Rates: to be charged, 68; for public uses, 284-5, 293, 306-7; Contracts: service regulated by, 68; with city, 73, 304-5; acceptance of, 115; Issuance of stock and bonds, 68-9; Compensation for franchise, 69; Audit, 69; Examination of records and publication of reports, 69-70; Damages for injury or death, 70-71; Hours, 70, 907; Employees: citizenship of, 71; character, 156, 271; number, 907; Taxation, 75-8, 81; special assessments, 82; City's power as to franchises: granting, 82; alienation, 87; methods of disposing of, 88; Procedure for granting franchises, 84-5; City's power as to franchise clauses: streets to be used, 89; plant and equipment, extensions and improvements, 89; duration, 89; forfeiture, 90; purchase by city and disposition after purchase, 91-2; right to use streets, 92; time of beginning and completing construction, 92, 93; competition, 93; rates, service and operation, 94; taxation, and compensation for franchises, 95-6; paving, and removal of mains, 96; issuance of stock and bonds, 96-7; audit and reports, 97; transfer of franchises, 98; labor matters, 98; renewal of franchises, 99; enforcement of, 99-100, 101-2; Quality of water: 100, 222, 286; part filtered, 204; canal providing sedimentation, 205; Polluted private wells, 101-2, 286; Franchise provisions: forfeiture, 103-4; acquisition by city, 105; property owners' consent not required, 105; time of beginning and completing construction, 105, 106; rates, 107; purity and pressure, 110-11; plant and equipment, 111-12; regulation by city, 112; taxation, 112; paving, 113; miscellaneous, 114; transfer and removal of franchises, 114, 115; enforcement of, 116, 117; Free service: to city, 113; to councilmen, 155; Granting of franchises: deliberation, 119; scandal, 119-20; publicity, 120; Drafting of franchises, 120; Not active in politics, 155; Appointments not made for political reasons, 156; Paternal in dealing with employees, 156; Sick and accident benefits, 156; Open shop, 156; Welfare work, 156-7; Wages, 157, 907; Supply: sources, 160-1, 303; system of, 161-3; amount of, from each source, 165; amount of, 166; facilities for, sufficient, 171; damages because of failure of, 286-7; sanitary inspection of sources of, 212; land owned for sanitary protection of, 216; public water, 302; Methods of distribution, 171; Reservoirs: capacity of, 172; storage in, 174; Pumps: capacity 174; dynamic head, 177; foot-gallons per 24 hours, 177; Pumpage, 175, 297, 300; Consumption, 179, 234-5; Mains: kind of pipe used, 180; length of, 182, 183; diameter of, 184; breaks in, 296; letter of manufacturers relative to breaks in, 312-14; Gate-valves, 184; Services: kind and length of pipe used, 185; metered, 232-3; maintained by consumers, 255; pipes not run prior to paving, 274; records of, by date, 275; Filtration, 206-7; Analyses: 219-20, 222; not published, 219; Typhoid fever, 223; Death rate from various diseases, 223; Amount sold, and furnished city, 233-4; Meters: optional use of, 235; tests of, 235-6, 277; Hydrants, 236, 297, 308; Pressure: measuring of, 239; recorded, 243; tests by Nat'l Board of Fire Underwriters, 243-4; maximum and minimum, 244, 245; at hydrants, 245; complaints on, 246; Interruptions of service, 246-7, 286-7; Extensions, 250, 251, 252, 253, 254, 306; Street work: 254, 255; permits for, 256, 257; Maps, 256; Underground structures: locating, 256; protecting, 272; Purchase of supplies, 257, 258, 259, 262; Plant and

[illegible] adequate, [illegible], condition of, [illegible]; Offices conveniently located [illegible]; [illegible] of complaints, [illegible], 270, Badges, [illegible], Harmony between dep'ts, [illegible], Telephones, 271, Guarding at night, [illegible], Fires, attendance at, 272, in year, [illegible], Drafting room, 273, Tools, 273, Attention to orders to turn on water, 271, Work in [illegible], [illegible], 277, Cost of a [illegible] unit of service, [illegible], Fire insurance rates as influenced by waterworks deficiencies, [illegible], [illegible]-6, 31[illegible]-12, Use of other than company water, 286, [illegible]; Coal used, [illegible]; [illegible] of commercial bodies on waterworks deficiencies, 31[illegible]-11, Description of city, [illegible], Riverside and Washington [illegible] pumping stations, 343-5.
[illegible] Water Works Co.: bankruptcy of, [illegible].
[illegible] rates, fire: Extra premiums because of waterworks deficiencies: Chicago, [illegible], [illegible], New Haven, 29[illegible]; [illegible], [illegible]-12. Charged in: Cleveland, [illegible], Syracuse, [illegible], Indianapolis, [illegible], [illegible], [illegible]-6, New Haven, 287-8, Charge for, on waterworks, 377, 379, [illegible], [illegible] of, as a charge on [illegible] electric works, 867.
[illegible] rates: Of municipal and private works compared: water, 372-[illegible], Wheeling gas, 571-2, electric, 814-17, Mass. electric, 113[illegible]-[illegible], Provision for payment of, by works: water, [illegible], [illegible], [illegible], electric, [illegible], Mass. electric, 1144.
Labor and Politics, reports on, for works: water, [illegible] ff., gas, [illegible] ff., Philadelphia gas, [illegible] ff., electric, 719 ff., all works, [illegible] ff., Mass. electric, 91[illegible].
Labor matters: Franchise provisions on: water, [illegible], gas, 471, electric, 712-4, Conditions of labor, Philadelphia gas works, [illegible], Mass. electric works, 96[illegible] ff.; Observance by Philadelphia gas works of laws relating to, [illegible], Labor as an element in cost of production of Philadelphia gas, [illegible] ff.
Lake Michigan Hydraulic Co. (Chicago): charter, [illegible].
[illegible] of works: Gas, 541; Electric: 76[illegible]-[illegible], Allegheny, [illegible], Detroit, 777, 778, South Norwalk, [illegible], Mass. electric, 1013-[illegible], [illegible] et seq., [illegible], [illegible], Hours of electric works, [illegible]; Number of, and time per year of Chicago electric works, [illegible], Cost of, rented by Chicago, [illegible], Cost of, to Chicago, and cost if rented, [illegible].
[illegible], ownership of by works: electric, [illegible], Mass. electric, 11[illegible].
[illegible], Arthur, testimony on political influence of Philadelphia lighting companies, [illegible].
[illegible] of works: Chicago water, [illegible]; gas, [illegible]; Philadelphia gas under [illegible], [illegible], [illegible]; Philadelphia gas, 188[illegible]-[illegible], [illegible].
[illegible]: see History and Legislation.
[illegible], W. A., Supt. of Water Pipe Extension in Chicago: extract from report of, [illegible].
[illegible] of works: see also Bonds: Water: [illegible]; Chicago, [illegible]; Cleveland, [illegible]; Syracuse, 417; Wheeling gas, [illegible]; [illegible], [illegible]; Electric, [illegible], [illegible] for payment, [illegible]; present, [illegible]; Chicago, [illegible]; Mass. electric, [illegible]; provision for paying, 1143-4; present, 1150 ff.
[illegible] paid by gas companies, 417, 47[illegible].
[illegible] of electric works: powers of cities as to [illegible] from streets, 712-14, underground, 765-6, 1003-4; overhead, 766-8, 1004-13.
Mains of works: Water: powers of cities as to removal from streets, 96, laid, 179-85; in New Haven, 289; breaks in, 293-6; breaks of, in Indianapolis, 307-8, Work on, in Chicago in 1905, 323; charges for laying, 359; Gas: powers of cities as to removal from streets, 472, 484; description of, 540; Philadelphia gas works: laid by, 1886-96, 610, 611; laid by United Gas Improvement Co., 1898, 1905, 610, 611.
Manufacturers' Gas Co. (Wheeling): franchise of, 476.
Maps of works: water, 255-6; gas, 555; electric, 788; Mass. electric, 1084.
Marblehead municipal electric works: see Massachusetts Electric Works.
Marwick, Mitchell and Co., reports by, on Financial Matters of works: water, 353 ff.; Wheeling gas, 568 ff.; electric, 803 ff.; Chicago electric, 1887-1905, 836 ff.
Massachusetts Board of Gas and Electric Light Commissioners: see Gas and Electric Light Commissioners.
Massachusetts electric works: Historical and General, 909 ff.; Dates of beginning supply, and early history, 909-13, Character of organizations, and changes in ownership, 913-16, 918-19; Sentiment toward, 916-18; Competition: with electric works, 918; gas works, 921-2, Population of cities, 919-20; Supervision: of municipalities, 922 ff.; by Gas and Electric Light Commissioners, 923; public, 396 ff.; state, 938; cities, 938-9; Powers of cities as to works: construction, acquisition and operation, 922; taxation, 922, 936; to incur debt, 922; to fix rates, 935-6; Reports to state, 923; Tests of service, other than by cities, 923, Statutory provisions on municipal works: purchase, construction and operation, 923; nature of plant and equipment, 927-8, extensions, 928; charges, 928-9, service, 929-30; issue of bonds, 930; use of income, 930-1; sinking funds, 932; Procedure to construct or acquire plants by cities, 922-4, purchase of private companies before establishment of public, 924-7; Area to be served, 927, Orders of Gas and Electric Light Commissioners: on selling current below cost, 932-4; provision for depreciation by Holyoke, 934-5; on attempts of cities to establish works without purchasing private works, 935; Incorporation of companies: 936-7, fees for, 938, Charter provisions, 937-8; Taxation of companies, 938-40, Franchises of companies, 940 ff., powers of cities to grant, 941; deliberation and publicity in granting, 945; drafting of, 945, Franchises in force: date granted, by what authority, duration, exclusive or competitive, mileage of streets granted, 942, Franchise provisions: Uxbridge and Northbridge co., 943-4, all companies, 942-4, Labor and Politics, 946 ff., Supreme governing bodies, 946-51, Salaries, 948-9, 956-68, Wages, 966-69, 967-71, use of political power of employees to increase, 961, promise of higher, by candidates, 614, payment for overtime, 972, vacations and holidays, 973-4, sick leave, 974-5, payment of medical expenses of injured employees, 976; badges, 976, surety bonds, 977, free service and gratuities to employees, 978; payment of, 978-9, fixing of, 979, observing union rates, 979; payment of fares of employees; Number of salaried officers, 960, Chief executive officers and heads of engineering service, 951-6; Employees, 956-61,

965-71; selecting and discharging, 960-1; conditions of employment, 961-3; character of, 1094-5; Political Conditions, 963 ff.; votes of employees, 964; holding of office by employees, 964; political influence of companies on selection of franchise-controlling bodies, 965. Free service, 965, 1122-3; Labor Matters, 965 ff.; Elections of officials, 966; Hours: 971-3; attempt by employees in Salem to shorten, 980; Welfare work, 977-8; Strikes and labor disputes, 980; Enforcement of laws on labor matters, 980; Treatment of employees, 981; Bicycles, 981; Technical journals and attendance at meetings, 982-3; Number killed or injured, 983; Damages paid for death or injury, 983-4; Engineering Matters, 985 ff.; Year covered by investigation, 985; Steam engines, 985-9; Boilers, 989-92; Gas and auxiliary engines, 992-3; Auxiliary apparatus, 993-4; Dynamos, 995-1002; Transformers, 1002-3, 1017-28; Meters: 1017-28; tests of, 1065-6; Lines: underground, 1003-4; overhead, 1004-13; Distribution systems, 1003 ff.; Lamps: arc, 1013-14; incandescent, 1016-17; in use, 1032 *et seq.;* charges for, and hours of, 1131-3; ownership of posts, 1133; Motors, 1017; Switchboards, 1031; Consumption: 1032 *et seq.:* per capita, 1063, 1212, 1213; metered current sold, 1212; Underground conduits: 1061; protection of, 1096; Means to extend business, 1067-8; Service: quality of, 1069-75; outages, 1071-3; Extensions, 1075-81; Street work, 1081-5; Purchase of supplies, 1085-9; Condition of plant and equipment, 1089-91; Location of offices, 1092; Handling of complaints, 1092-4; Badges, 1094; Ventilation, 1091; Harmony between dep'ts, 1095; Telephones, 1095; Attendance at fires, 1096; Reports of operation to manager, 1096-7; Drafting rooms, 1097; Tools, 1097-8; Attention to orders to turn on current, 1098; Dead services, 1098-9; Work in houses, 1099, 1100; Financial Matters, 1101 ff.; Rates and charges, 1101 ff.; changes in, 1106-7, 1110-15; for extensions, 1107-8; connections, 1108; repairs to meters, 1108; laying pipes, 1108-9; meters, appliances and renewals, 1109-1110; before and after municipalization, 1115-16; Collection of bills, 1116-17; Accounts: system of, and audit, 1117-18; charging of items to proper, 1118-19; charges for taxes, insurance, etc., 1120-1; crediting of services to city, 1121-2; storeroom accounts, 1123-4; items omitted from books, 1126-7; Meeting of deficits, 1124; Interest rates of municipal plants compared with companies, 1124-5; Appropriations for, 1125; Liabilities: cancelled, 1126; provision for payment of, and interest, 1143-4; present, 1146 *et seq.;* Bonds: 1135-9; provision for payment of, 1126; funded debts other than, 1140-2; funds secured other than from, and stocks, 1143; Records of costs of construction work, 1127-8; Fuel used, 1128-9; Water used, 1130; Contracts for public lighting, 1130-1; Capital stock: 1134; issue of, 1135; Assets, 1145-6 *et seq.;* Receipts, 1146-7 *et seq.;* Expenses: 1147-8 *et seq.;* per kwh., 1212; Profit and loss accounts, 1148-9 *et seq.;* Income and expense, per kwh., 1212.

Materials, purchase of: see Supplies, purchase of.

Maury, Dabney H.: report on Engineering Matters in waterworks, 159 ff.

Merriam, Charles Edward: statement on taxing power of Chicago, 20, 21.

Meters of works: Chicago water: use of recommended, 167; tests of, 225; Cleveland water, advisability of installation of, 225-8; optional use of, 229-30; tests of, 230; Syracuse water, 230-1; optional use of, 231-2; tests of, 232; Indianapolis water: optional use of, 235; tests of 235-6; New Haven water: optional use of, and tests of, 238-9; All waterworks: tests of, 277; charge for repairs to, 358-9; charge for, 359-60; Gas: Philadelphia, 527; other works, 541; tests of, 546; Electric: 770; tests of, 780; charge for repairs to, 804; Mass. electric works: 1017-18; tests of, 1065-6; charge for repairs to, 1108; charge for, 1109-10.

Monopoly rights: see Competition.

Motors owned by works: electric, 770; Mass. electric, 1017.

Natural Gas Co. of West Virginia (Wheeling): Franchise of, 476; Franchise provisions: forfeiture, 477; purchase by city, 478; time for construction, 479; rates, 479; plant and equipment, 480; Free service to city, 483; Difficulties with city, 485-6; Furnishing of gas for light by: forbidden, 480; done, 493-4.

Negroes; disfranchised in Richmond, 495-6; employment of, by Atlanta gas co., 498.

New Haven Water Co.: Date of beginning supply, 1, 123; Original and present character, 7; Sentiment toward: 12-13; sentiment for purchase by city, 124-5; in 1901, 130; Competition, 14, 122; Purchase of Fair Haven water co., 14; Population of city, 16; Incorporation: 60; fees for, 64; Charter powers, 60, 61, 62-4; Supervision: state, 64; city, 73-4; resistance to, 74-5; Laws relating to, 62-4, 66; Prevention of pollution, 67; Water rates a lien on real estate, 67; Area to be served, 67; Statutory provisions: profits, 69; strikes, 71; enforcement of, 72; Rates: to be charged, 68, 107-10; for public uses, 293; charged, 356; enforcement of, 357; for meter repairs, 359; for connections, 359; changes in, 1900-6, 360, 361; Service: regulated by contract, 68; interruptions of, 246, 247; Stock: issuance of, 62, 63; issued, 383-4; Bonds: issuance of, 62, 63; issued, 392; Contract provisions: on dividends, 69; forfeiture, 104; acquisition by city, 105; property owners' consent, 105; rates, 107-10; Examination of records, 69; Employers' liability, 70; Hours, 70, 907; Employees: citizenship, 71; number of, 907; Reports to state, 72; Fees: to be charged company by city limited by court decision, 73; paid, 81; Street work; 73-4; at less cost than by city, 158; done by contract and direct employment, 254; permits for, 256, 257; Taxation: local, 74-5, 78-81, 82; none by state, 77; City, no power to grant franchises, 82; Contracts with city: procedure for letting, 85-7; deliberation and publicity in letting, 119, 120; drafting of, 120; first contract, 123-4; second contract, 128-129; contract of 1891, 129-30; contracts proposed in 1902, 131; contract of 1902, 131-2; opposition to contract of 1902, 132, 135; Powers of city as to: streets to be used, 89; plant and equipment, extensions and improvements, 89; purchase by city, 91; time for construction, 93; competition, 93; rates, 94; service and operation, 94-5; taxation, 95; compensation for franchises, 96; paving, and removal of mains, 96, 113; issuance of stock and bonds, 97; audit and reports, 97; transfer of rights, 98; labor matters, 98; renewal of rights, 99; en-

[illegible] of contract provisions, 1[illegible]. Power of city to utilize, if required, 92 [illegible]. Right to use streets, [illegible]. Franchise of, granted by state, 1[illegible]. Free service, 1[illegible], [illegible], [illegible]. Right to transfer franchises, 11[illegible]. Supplementary report on history, 1[illegible]; historical sketch, 345-6; history of, by secretary of, 346-9. Attempts to establish municipal works, 1[illegible]. Organization, 1[illegible]. Honesty and skill of contractors on system, 1[illegible]-3. Purchase by city, attempts at, 1[illegible]-8; views of [illegible] Baldwin on, 1[illegible]. Progress of company, 18[illegible]-91, 129, 1891-[illegible], 1[illegible]. Political influence of, 13[illegible]. Capitalization, 1[illegible]. Dividends on stock said to be "watered," 1[illegible]. Not guilty of stock-watering, 13[illegible]. Bribery charges, 1[illegible]. Employment, 157-8. Supply, sources of, 1[illegible]; system of, 16[illegible]-4; amount of, [illegible], [illegible]; sufficient, 171. Inspection of, [illegible]; land owned for protection of, [illegible]. Method of distribution, 171, 1[illegible], 1[illegible]-2. Reservoir capacity, 172. Pumps capacity, 171; static head, 176. Artesian head, 177. [illegible] gallons per 24 hours, 177. Pressure, 17[illegible], [illegible], 3[illegible]-1. Consumption, 17[illegible], [illegible]-8. Mains: kind of pipe used, 1[illegible]-1; length, 18[illegible], 18[illegible]; diameter, 1[illegible]; laid, [illegible]; breaks in, [illegible]; extended from, [illegible]. Use of fire steamers, [illegible]-2. Gate-valves, 1[illegible]. Services: kind and length of pipe used, 1[illegible]; metered and unmetered, [illegible]; work on prior to paving, [illegible], [illegible]; records of, by date, [illegible]; form of notice to consumers to examine, [illegible]. Quality of water; part filtered, [illegible]; purity, 214-1[illegible], [illegible]. No settling basins used, [illegible]. Typhoid report to, [illegible]; Typhoid fever, [illegible], [illegible]. Analyses, [illegible], [illegible]; not published, 2[illegible]. Amount sold, metered and unmetered, [illegible]. Meters: optional use of, [illegible]; tests of, [illegible], [illegible]; rentals for, [illegible]. Hydrants, [illegible], [illegible]; care of, [illegible]. Pressure, [illegible]9, 241, [illegible]; complaints as to, 24[illegible]. Extensions, [illegible], [illegible], [illegible], [illegible]; cost of, [illegible]1; [illegible], [illegible]. Water used in [illegible], [illegible]. Care of trenches, [illegible]. Maps, [illegible]. Underground structures: locating, [illegible]; protecting, [illegible]. Purchase of supplies, [illegible], [illegible], [illegible], [illegible]. Plant and equipment adequate, [illegible]; condition of, [illegible]; care of, [illegible]. Pumping stations, [illegible]. [illegible], [illegible]. Offices, [illegible]. Handling of complaints, [illegible], [illegible]. Badges, 271. Character of employees, [illegible]. Harmony between depts., 271. Telephones, 272. [illegible] at night, [illegible]. No attendance at fires, [illegible]. Drafting room, 272. Tools, [illegible]. Attention to orders to turn on water, [illegible]. Work in houses, [illegible], 277. [illegible] insurance rates, [illegible]; extra [illegible] because of deficiencies of works, [illegible]. Report of Nat'l Board of Fire Underwriters, [illegible]. Cost of a [illegible], [illegible]. [illegible], [illegible]; [illegible] of [illegible] fire protection, [illegible]. Use of other than company water, [illegible], [illegible], [illegible]. [illegible] of [illegible], [illegible]. Administration of, by secretary of, [illegible]. Collections of bills, [illegible], [illegible], [illegible]. Accounting system of, [illegible]. Charging items to property, [illegible], [illegible]; expenses not charged, [illegible], [illegible]; free service not credited, [illegible]; charging out materials, [illegible]. [illegible], [illegible]. Interest rate of city bonds, [illegible]. [illegible], [illegible]. Cost [illegible], [illegible]. [illegible], [illegible]. Wages, [illegible].

Norfolk City Gas Co.: [illegible] for [illegible], [illegible]. Date of beginning supply, 42[illegible]. Origin of, 427. Present character, 427. Charter: amendments to, 42[illegible], 445-6; duration of, and renewals, 443; power of state to amend, 443-4; powers granted, 444-5, 446; copy of, 467-8. Consolidations of companies, 428, 431. Sentiment toward, 430. Sale of electrical apparatus, 431; Stock owned by Norfolk Railway and Lighting Co., 432; Population of city, 432; Competing electric companies, 433. Supervision: public, 442 ff.; by State Corporation Commission, 447, 452; city, 452-3, 453-4; Incorporation: date and place of, 442; under special act, 443. Taxation: 447, 481; state, 454-5; local, 456; assessments for local improvements, 458-9. Laws relating to: 447, enforcement of, 451-2; Statutory provisions: size and location of plant, 448; extensions, 448; issuance of stock and bonds, 449; Compensation for rights, 449; Examination of records, 450. Hours, 450; Reports to public authorities, 451. Penalty for blacklisting workmen, 451; City's power as to franchises: granting, 459; alienation, 462; duration, 466, forfeiture, 467; transfer, 474; renewal, 474-5. Procedure for granting franchises, 460: City's power as to: streets to be used, 462; plant, equipment and extensions, 465; acquisition by city, 467, 478; disposition of plants acquired, 469, 479; property owners' consent, 469, time of construction, 469, 470; competitive rights, 470; service, 471; taxation, 471-2, compensation for franchises, 472; paving, and removal of mains, 472; stocks and bonds, 472-3; records and audit, 473, labor matters, 474; enforcement of, 475; Rates: city's power as to, 470, charged, 1865-1906, 470-1; Attempt of R. B. Fentress to secure competing franchise, 474-5; Franchises: gas, in force, 476-7; right of state to forfeit, 478; transfer of, 481; No free service required by franchise, 481. Street work: franchise provisions as to, 4[illegible]4, doing of, 554, permits for, 555; Renewals of franchise not required, 485; Granting of franchises: deliberation in, 488; scandal and publicity in, 488-9; Drafting of franchises, 489; Process of gas making and purifying, 537; Coal gas works, 5[illegible]8; Water gas works, 538; Purifying plant, 539. Holders, 540; Mains, 540; maps of, and fixtures, 555; Meters: 541; tests of, 546. Services, 541; work on, prior to paving, 555, 561; records of, by date, 561. Stoves rented, 541; Services metered and unmetered, 542, 543. Consumption, 543-4, 54[illegible], 546. Leakage, 54[illegible]. Output, 545. Means to extend business, 547. Gas: kind of, supplied, 547; air mixed with, 547; candle power, 548, 5[illegible]; purity, 549. Pressure, 5[illegible], 551, 552. Interruptions of service, 552. Extensions, 5[illegible], 553, 5[illegible]. Underground structures: locating, 5[illegible]; protecting, 560; Purchase of supplies, 5[illegible], 5[illegible]. Adequacy of plant, 5[illegible]. Ventilation and guarding of machinery, 557. Location of offices, 557. Handling of complaints, 558; Badges, 5[illegible]; Character of employees, 5[illegible]. Harmony between depts., 559. Attendance at fires, 559. Reports of operation to manager, 5[illegible]. No drafting room, 5[illegible]. Care of tools, 560, 561. Attention to orders to turn on gas, 561. Work in houses: regulations on, 562-4; inspection of, 565.

Norfolk Gas and Electric Co.: charter, 4[illegible]; consolidations with other companies, 429, 431.

Norfolk Railway and Lighting Co.: ownership of stock of Norfolk gas co. by, 432.

North Attleboro municipal electric works: see Massachusetts Electric Works.

Northampton municipal electric works: see Massachusetts Electric Works.

Norwalk and South Norwalk Electric Light Co.: incorporation of, 672.

Norwalk Gas Light Co.: history, 672.

Offices, location of, of works: water, 268; gas, 387; electric, 795; Mass. electric, 1092.

Organization of works: gas, water and electric, 385 ff.; Mass. electric, 946 ff.

Outages of lamps of electric works: 782-3; Chicago, 883; Massachusetts, 1071-3.

Output of works: gas, 344-5; electric, 775-9; Mass. electric, 1032 *et seq.*

Overtime, payment for, by works: water, 145; Atlanta gas, 499; electric, 758; Mass. electric, 973.

Ownership, changes in, of works: water, 7-10; gas, 427-9; and management of electric, 668-72; Mass. electric, 913-15.

Park, William H.: chief engineer of Philadelphia gas works, 503.

Paving by companies: water, 96, 113; gas, 472, 484; electric, 712-13, 787-9.

Payrolls, padding of, by works: Syracuse water, [illegible]-2, 155; Philadelphia gas, under trustees, 593-4.

Peabody municipal electric works: see Massachusetts Electric Works.

Peninsular Electric Co. (Detroit): Franchise: date of, by what authority granted, duration, competitive, for entire city, 723; Franchise provisions: forfeiture, 734; service, 734; regulation by city, 737; labor matters, 743; enforcement of, 745.

Pensions for waterworks employees: 53-4.

Permits for street openings by works: water, 256-7; gas, 355; electric, 788-9; Mass. electric, 1084-5.

Phelps, C. E., Jr.: report on Engineering Matters of electric works, 758 ff.

Philadelphia gas works: See also Philadelphia Gas Works, report on Relation of City to; Report on personnel of, 1887-1905, 500 ff.; Organization, and powers of mayor, 500-1; appropriations for, 501; Extract from mayor's reports, 1895-6, as to quality of gas, 501; Directors of public Works, 501-2, 504-5; Powers of council, and relation to, 502; City did not attempt to extend business, 502; Bad record of Bureau of Gas, 502-3; Engineering force: city, 503; company, 504, 505; Storeroom keeper, 503; Sup't of works, 504; Architect and draughtsman, 504; Lack of chemical dep't, 504; During lease to United Gas Improvement Co., 505-6; Experience of officials: city, 505-6; company, 506; Work of research committee, 506; Contributions to gas literature, and patents obtained by company force, 506; Promotions: under city, 506, 507; company, 506-7, 528; Employees: selecting, 507-9; secured through political channels, 507, 508; Councilmen: relation to works, 507; effect of appointment of employees to help, 507-8; statement of W. H. Gartley as to employment by company of men recommended by, 520-2; Hours, 509, [illegible]; Wages: Equalization of, under city and company, 509-11; paid, [illegible]; Employees: age of, 509; sup't's power to hire and discharge, 509; city and company, [illegible]; System of developing wage-earning capacity of employees, 509-11; Lax discipline under city, [illegible]; Absenteeism of employees, [illegible]; Relation of employees to economy of manufacture: city, 511-12; company, 512-13; Poor condition of works under city, 511; Attempts to improve condition of works, 511-12; Poor machinery under city, 512; Extra labor, 512-13; Economy of manufacture, 513; Comfort of employees, 513-14; Accident cases, 514-16; Welfare work, 516, 528; Appointment of salaried employees, 517-18; Observance of laws relating to labor and safeguards against accidents, 518-20; Department of distribution: city, 522-6; company, 526-31; Street work: city, 522-3; company, 527; Tools used by city, 523-4; Installation of services by city, 524; Attention under city to complaints, 524-6; Stoves, etc., 527; Superintendents, company: of meters, stores, stables, 527; records, paving, 528; Meetings to discuss progress of work, 528-9; Records of work done, 529; Street lighting, 529-31; Dealing with consumer, 531-4; Use of gas ranges, etc., 533-4; Collection of bills, 533; Turning gas on and off, 533.

Philadelphia gas works: report on Relation of City of Philadelphia to, 588 ff.; Early proposals for lighting city, 588; Ordinance for construction of city works, 588-9; City councils: gas trustees to be elected by, 589; attempts of, to secure control of works, 592; shortsightedness of, 1887, 602; unwillingness of, to appropriate for works, 607-8, 632, 633; willingness to appropriate for water gas, 619; relation of, to city works and company, 627; Completion and enlargement of plant, 589; Loans: provision for payment of, 589; on basis of ordinances of 1841 and 1853, 590-1; to Dec. 31, 1886, 591-2; Municipal ownership under trustees, 589 ff.; Possession taken by city, 589; Management of, 590; Sinking funds 590-2; Disposition of surplus, 591; Profits: to Dec. 31, 1886, 591-2; fictitious, 1874-87, 596; in 1888, 602; use of, by councils for city purposes, 628-9; 1889-93, 629; 1894-96, 629; 1887-96, 629-31; Political influence of trustees: 592-3; effect of, on payroll, 602; Committee of 100 to fight gas ring, 593; Deterioration of plant under trustees, 593; Coal: excessive price paid for, 593; used, and cost, 1886-97, 605-7; use of, and water gas, 1886-97, 620; Padding of payroll, 593-4, Loss to city by management of trustees, 594; Period of municipal management, 594 ff.; Assets and liabilities when turned over to city, 594-5; Depreciation under trustees, 595-6; Deficits: 1884-87, 596; in 1887, 602; 1894-96, 629; 1887-96, 629-31; Antiquated condition of, when taken over by city, 596-7, 599-600; Improvements: expenditures for, and extensions, 1883-7, 597-9; in first year under city, 601-2; expenditures for 1887-96 629-31; struggle for, 632 ff.; 1888-91, 632-3 statement of mayors as to need of, 1894-6, 633-4; summary of struggle for, 642-3; expenditures by company for, 1897-1905, 643; Leakage, 599, 616-17; Condition of works, 1888, 600-1; Labor as an element in cost of production, 602 ff.; Wages: per M. cu. ft., 1886-97, 603; political influence on, 604; Employment by company, on recommendation of councilmen 604; Inequalities in labor, 606; Distributing system: 607 ff.; poor condition of under city, 608; Expenditures for works, 1887-97, 609; Mains laid, 1886-96, 610, 611; Accounting: system of under city 611-12; lack of control of, by city over company, 650-1; Quality of gas: city, 612-13; to be supplied by company, 646-7; Residuals: amount received from, 613-15; Irregularities in disposal of, 615-16; Water gas contract of 1885, 617 ff., irregularities in letting, 618-19, unenforceable stringency of, 621, report of Senate Committee on, 621-4, understanding between city officials and company as to, 624. Leasing of part of works to company, [illegible], Public lighting, [illegible] ff., influence of [illegible] on, [illegible]-7, Need in 1886 of [illegible], [illegible], Reports of chiefs of Bureau of Gas on, [illegible]-5, 637, [illegible], 639, [illegible], [illegible], Reports of directors of public works on, [illegible]-8, [illegible]-9, [illegible]-40, [illegible]-1, 642, Lease to company, 642-4, terms of, 644 ff., duration and renewal of, 644; payments to be made by city on termination of, 644; appraisal of property of company on termination of, 644-5; works to be delivered to city on termination of, 645-6, Statements of company to controller, [illegible], Expenditures agreed to be made by company, [illegible], Rates to be charged, [illegible], Payments to be made by company if rates were not reduced, 647, Payment by company toward salaries of meter inspectors, 647, Deficiencies of lease, [illegible]-1, Payments made to city by company, [illegible], Failure of councils to reduce rates, [illegible], Service under lease, [illegible] ff., Ordinance authorizing and form of lease, [illegible], Bibliography, 661.

Politics and Labor: see Labor and Politics.

Political influence of companies in Syracuse, [illegible]; in Wheeling gas works, 444; of Philadelphia gas trustees, [illegible]-3; in Allegheny electric works, [illegible]-4; of Mass. companies, [illegible].

Pollution of water: Indianapolis, 13; Right of cities to prevent: Chicago, 21; Indianapolis, [illegible]; New Haven, 67.

Population of cities served by works: water, [illegible]; gas, [illegible]; electric, [illegible]; Mass. electric, [illegible].

Pressure maintained by works: water, [illegible]; gas, [illegible].

Prices for service: see Rates.

Prices paid by public and private works for supplies: water, [illegible]; gas, 556; electric, [illegible]; Mass. electric, 1097.

Prichard, Charles F., reports of, on Massachusetts electric works: History and Legislation, [illegible] ff.; Labor and Politics, [illegible] ff.; Engineering Matters, [illegible] ff.; Financial Matters, 1101 ff.

Profit and loss accounts of works: see also Surplus Accounts. Water: Chicago, [illegible]; Cleveland, [illegible], 410-11, [illegible]; Syracuse, [illegible]; Wheeling gas, [illegible], since 1871, [illegible]; Philadelphia gas, [illegible]; Electric, [illegible]; Mass. electric, [illegible] et seq.

Profit-sharing by employees of Indianapolis Water Co., [illegible].

Public lighting by works: Philadelphia gas, [illegible]; electric, [illegible].

Pumpage by waterworks, [illegible]; Indianapolis, [illegible].

Pumping stations of waterworks, [illegible]; Chicago, [illegible]; New Haven, [illegible]; Indianapolis, [illegible].

Purchase of supplies by works: see Supplies, purchase of.

Purchase of works by cities: Water, 17 [illegible]; [illegible] waterworks [illegible]; [illegible] New Haven [illegible] waterworks, [illegible]; Gas, [illegible]; [illegible]; Mass. electric, [illegible].

[illegible] of gas, [illegible], public for, [illegible]-9.

Rates for service by works: Statutory provisions on: water, [illegible]; Wheeling gas, [illegible]; electric, [illegible]; Mass. electric, 928, Powers of cities to fix: water, 58, 59, 93-4, Wheeling gas, 442, Norfolk gas, 448-9, all gas, 470-1, electric, 697, 710, Mass. electric, 932-4, Charged: water, 292-3, 353-61, Indianapolis water, 306-7; Norfolk gas, 1865-1906, 470-1; gas companies, 479-80; Wheeling gas, 568-9; electric, 727-9, 803; Mass. electric, 1101-6; Changes in: Wheeling gas, 587; electric, 805-6, Mass. electric, 1106-7, 1110-15.

Receipts of works: Water: Chicago, 394, 401-2; Cleveland, 404-5, 414-15; Syracuse, 417, 423; Wheeling gas, 579-80, 587; Electric: 842, Chicago, 1888-1905, 874-7; Massachusetts, 1146-7 *et seq.*

Records of works: Examination of, by public: water, 69, gas, 450, 473, electric, 714, 737-9, Of cost of construction work: water, 383; Philadelphia gas, 529; Wheeling gas, 574; electric, 820-1, Mass. electric, 1127-8; Sup't of, Philadelphia gas co., 528.

Reports of works: Water, 48-9, 58, 69-70, 97, Gas: Wheeling, 440-1, 442; Norfolk 451; all gas, 47[illegible], 504; Electric: 740-2, 798; Massachusetts, 928, 1096-7.

Reservoirs of waterworks: capacity, 172; storage, 174-5, 179; Syracuse Woodland reservoir, 339-40.

Richmond municipal gas works, report on Labor and Politics: Management of service, 495, 886 ff.; Little scandal in politics, 495; Disfranchisement of negroes, 495-6; Wages: 496-7; not result of labor or politics, 497, sick leave and payment of medical expenses, 497, per hour, 500; salary of chief executive officer, 892; Employees: length of service and promotion, 497, 894, not members of unions, 497; Governing body: not salaried, 887; authority of, 888, 889, 890; Chief executive officer and head of engineering service, 890, 891, 892, Salaried officers, 893; Political conditions, 895 ff.; Conditions of suffrage, 895, Employee voters, 896; Free service, 896.

Rogers Park Water Co. (Chicago): area served, 12, 32-3, Difficulties with Chicago, 100-1, Possession taken of, by Chicago, 101; Franchise: date granted, by what authority, duration, exclusive or competitive, territory to be served, 102; Franchise provisions: forfeiture, 103, acquisition by city, 104, property owners consent not required, 105; time for construction, 106; rates, 108-9; purity and pressure, 110, plant and equipment, 111, regulation by city, 112, paving, 113; free service, 114, enforcement of, 115, 116, 117, Power of city to utilize, if acquired, 1[illegible], Free service to city, 112-13; Right to transfer franchise, 114, Right to renewals of franchise, 114-15.

Rowe, Leo S., report on Relation of City of Philadelphia to Gas Supply, 518 ff.

Salaries paid by works: see also Wages, water, [illegible]; Wheeling gas, 441, [illegible], electric, [illegible], [illegible]; governing bodies, 887, chief executive officers, [illegible], Mass. electric, [illegible]-9, [illegible].

Salem Electric Lighting Co.: see Massachusetts Electric Works.

Salmon River and Onondaga Water Co. (Syracuse): franchise granted and [illegible], [illegible].

Sanitary conditions of waterworks, [illegible]-23.

Sanitary District of Chicago: tax rate, 21.

Sentiment, public, toward works: water, 11-12; New Haven water in 1901, 128; gas, [illegible]; electric, [illegible]; Mass. electric, 916-18.

Service of works: see also Free Service. Water: statutory provisions on, 42, [illegible]; power of cities over, 94-5; Character of

246; Gas: regulation of service by Wheeling, 438; power of cities over, 471; character of, 547-50; Electric: franchise provisions on, 730-4; character of, 780-4; Massachusetts electric: statutory provisions, 929; character of, 1069-75.

Services of works: Water: tax for, in Syracuse, 44; kind and length of pipe used, 184-5; Cleveland, 225; Syracuse, 230-1; New Haven, 236; running of pipes for, in advance of paving, 274; records of, by date, 320; Chicago, 320; Gas: Philadelphia, 524; all gas works, 541, 542-3; improvement of, prior to paving, 554-5, 561; records of by date, 561; Electric: Allegheny, 775; Detroit, 778; dead services, 799; Mass. electric: dead services, 1098-9; records of, by date, 1099.

Sikes, George C.: statement on appointment by Chicago electric companies of men recommended by aldermen, 142-3.

Sinking funds of works: Water: 46-7, 376; Gas: Wheeling, 439-40; Philadelphia, 590-2; Electric: 691-2, 809, 810; Mass. electric, 932.

Sources of water supply: 159-72.

Southern Lighting and Power Co. (Atlanta): franchise of, 463-5.

South Norwalk municipal electric works: Date of beginning supply, 665; Present and original status, 666, 667, 679; Early history, 667; Changes in ownership, and establishment of, 672-3; Sentiment towards, 673, 674, 675; Competition: electric companies, 675, 676; gas works, 679; Consolidations of companies, 678; Population: city, 679, 780; on lines, 780; Powers of city as to: construction, purchase, operation, and condemnation of works, 681; taxation, 681-2, 698; debt, 683; rates, 698; Procedure to construct or acquire works, 686-9; Statutory provisions: purchase, 687; condemnation, 688; plant and equipment, extensions and improvements, 688; rates, 689; letting contracts, 690; depreciation, 691; sinking funds, 692; Area to be served, 688; Bonds: Issuance of, 691; provision for paying, 818; authorized, issued, and outstanding, 830, 831, 832; disposal of, 833; funded debts other than, 834; Audit, 693, 807; Publication of reports, 693; Salaries and wages: fixing of, 694; paid, 750; of electrical commissioners, 887; chief executive officer, 892; Laws relating to construction and operation, different from private works, 696-7; Power of city as to franchises: granting, 698-9; alienation, 702-3; Franchise granting: deliberation in, 747; no scandal in, 747-8; drafting of franchises, 748; Procedure to contract with companies, 701; Power of city as to companies: streets to be used, 705; nature of plants and equipment, extensions and improvements, 707; acquisition by city, and disposal of, 708; requiring of property owners' consent, 709; time for construction, 709; monopoly rights, and rates, 710; service, and regulation of operation, 710; taxation, 711-12; paving, 712; removal of mains, and locating of poles and wires, 713-14; issuance of stock and bonds, 714; audit, publicity of records and transfer of franchises, 714; means for enforcement of franchise provisions, 718; Difficulty with Connecticut Railway and Lighting Co., as to use of streets, 705-6; Power of city as to franchises: duration, 707; forfeiture, 707; compensation for, 712; renewal, 715; Franchises in force: date granted, duration, competitive, territory to be served, 723; Franchise provisions: forfeiture, 726; purchase by city, 726-7; right of city to operate works acquired, 727; property owners' consent, 730; service, 734; regulation and taxation by city, 737; paving, removal of wires, public inspection of records, and audit, 737; reports, and transfer of franchises, 742; renewal of franchises, 744; Enforcement of city's rights of regulation, 745, 746; Management of, 749; Employees: 749-50; not organized, 750; character of, 796, 797; Year covered by investigation, 759, 803; Boilers, 759; Engines: steam, 760; oil, 761; Auxiliary apparatus, 762; Dynamos, 764; Lines: underground, 766; overhead, 767-8; Lamps: arc, 769, 779; incandescent, 770, 779; renewals furnished free, 781; hours of, 827-8; number of, and charge for, 828; ownership of posts, 829; Motors, 770; Meters, 770; Switchboards, 771; Appraisal, 774-5; Services: 778; maps of, 788; underground, 799; Output and consumption, 778-80; Current regulation, 782; Outages, 782, 783; Service: character of, 781 *et seq.;* hours of, 783; interruptions of, 784; Voltage, 784; Tests and experiments, 784; Extensions: 784, 785, 786, 787; made free, 804; Street work: done by direct employment, 787; permits for, 788, 789; Purchase of supplies, 789, 790, 791, 792; Condition of plant and equipment, 792, 793, 794, 795; Ventilation, and guarding of machinery, 795; Location of offices, 795; Handling of complaints, 795-6; Badges, 796; Harmony between dep'ts, 797; Telephones, 797; Attendance at fires, 797; Reports of operation to manager, 798; Drafting room, 799; Care of tools, 799; Attention to orders to turn on current, 799; Work in houses, 800; Depreciation, 800-2; Rates: 803; changes in, 1900-6, 805-6; Payment of cost of: repairs to meters, etc., and connections, 804; appliances and renewals, 805; Collection of bills, 806; Accounts: system of, 807, 808, 809; charging of particular items, 810; expenses not charged, 810, 811; credits not made, 812; items omitted from financial statement, 820; Free service, 812, 813, 896; Interest rate compared with companies, 817; Appropriations for, 817; Liabilities: cancelled, 818; provision for paying, and interest, 834; present, 841; Records of costs of construction work, 821; Coal used, 821; Water used, 822; Funds received from miscellaneous sources, 834; Assets: 839-40; determination of value of, 840; Receipts, 842; Expenses, 848-9; Profit and loss account, 850, 853, 859-60; Organization, 885 ff.: Governing body, 888, 889, 890; Chief executive officer and head of engineering service, 889, 890, 891, 892; Salaried officers, 892; Employment, 893, 894, 895; Promotion, 893; Political conditions, 895 ff.: Conditions of suffrage, 895; Employee voters, 896; Employees holding city offices, 896.

State Corporation Commission of Virginia: supervision, and regulation of charges of Norfolk gas co., 447, 448-9.

Stebbins, Theodore: report on Engineering Matters of electric works, 759 ff.

Stock, capital, of works: water, 68, 96-7, 383-4; gas, 445, 446, 449, 472-3; electric, 714; Mass. electric, 937, 938, 1134, 1135.

Storeroom accounts of works: water, 371; electric, 813-14; Mass. electric, 1123-4.

Stoves, gas: introduction of, by Philadelphia gas co., 527; rented by gas works, 541.

Street lighting: see Public Lighting.

Street work by works: water, 254-7; Philadelphia gas, [illegible] gas, [illegible] Chicago electric, 734; electric, 757-8; Mass. electric, [illegible]

Strikes by employees of works: water, [illegible] Wheeling gas, [illegible] Detroit electric, [illegible] Mass. electric, [illegible]

Suffrage, conditions of, in cities owning works, [illegible]

Sullivan, J. W., reports on Labor and [illegible] in works: water, 170 ff.; gas, [illegible] ff.; electric, 740 ff.; supplementary, [illegible] ff.

Supervision, public, of works: municipal water, [illegible] private water, [illegible] municipal gas, [illegible] private gas, 412-59, electric, [illegible] ff.; Mass. electric, [illegible] ff.

Supplies, purchase of, by works: water, [illegible] gas, [illegible] electric, [illegible] Mass. electric, [illegible]

Surplus accounts of works (see also Profit and Loss Accounts): Water: Chicago, [illegible] Cleveland, 411-13; Syracuse, [illegible] Wheeling gas, 583, [illegible] South Norwalk electric, [illegible]

[illegible] of Massachusetts electric works, [illegible]

Syracuse City Water Works Co.: history, [illegible]

Syracuse municipal waterworks: Date of beginning supply, 1. Early history of water supply, 2-4, [illegible] Municipalization, [illegible] Commission to investigate question of municipal supply, 5. Organization of Water Board, 6. Bonds: Statutory provisions on issue of, 6, 22; provision for payment of, 376; issue of, [illegible] toward, 12, 13. Political [illegible] in city, 12. Population of city, 16. Powers of city as to works construction, [illegible] 17; eminent domain, 17, 32; [illegible] 17; taxation, [illegible] purchase by city, 31, 91; [illegible] of, 31. Procedure for construction or acquisition of works, 29-[illegible] Taxes paid, 30; charges for [illegible] and depreciation, [illegible] Area to be supplied, 31; Statutory provisions as to works: doing work by contract or direct employment, 30; plant and equipment, [illegible] extensions and improvements, [illegible] service, 42; use of [illegible] for [illegible] strikes, [illegible] Rates: statutory provisions on, 36-7; charged, [illegible] power to fix, [illegible] for public uses, [illegible] enforcement of, [illegible] meter repairs, [illegible]-9; service connections, [illegible] meters and appliances, [illegible] changes in, [illegible] kind and length of pipe used, [illegible] work on, prior to paving, [illegible] records of, by date, [illegible] Letting of contracts, [illegible] Audit, [illegible] Payments to [illegible] Publication of reports, [illegible] Wages and salaries, [illegible] of commissioners, [illegible] Political assessments of employees, [illegible] Hours, [illegible] Steam used by municipal works, [illegible] Supervision by state board of health, [illegible] Water quality of, [illegible] examination of, by state, [illegible] Powers of city as to [illegible] granting, [illegible] methods of [illegible] [illegible] renewal of, [illegible] Procedure for granting franchises, 84; Right to use streets, 92. Powers of city as to companies: streets to be used, plant and equipment, extensions and improvements, 89; time of construction, 92, 93, competition, 93, rates, service, and operation, 94, taxation, 95; paving and removal of mains, 96, issuance of stock and bonds, 96, audit and reports, 97; labor matters, 98. No water franchises in force, 102. Franchise granting: deliberation in, 118-19; publicity in, 120. Drafting of franchises, 120; Organization, 152, 886 ff.; Budget to be approved by council, 152; Superintendent's position and influence, 152; Relation to Civil Service, 153-5; Supply: source of, 160, yearly, 164-5; maximum and minimum, 165-6; facilities for, insufficient, 170-1; land owned for protection of, 216; no damages by lack of, 284. Method of distribution, 171; Reservoirs: capacity, 172, storage in, 174, 175, 179; Consumption, 179, 231, 297; Mains: kind of pipe used, 180; length of, 182, 183; diameter, 184; repairs to, in 1905, 296; connections to, free, 359; Gate-valves, 184; Appraisal: 186-7, notes on, 203-4, of mains and valves, 204; Pavement data, 204; Analyses: 212, 219, 221-2; not published, 219; Typhoid fever, 223; Meters: services metered, 230-1; amount sold through, 231; optional use of, 231-2, tests of, 232, 277; Hydrants, 232, 297; Pressures: measuring of, 239, recorded, 243; uniform, 244, 245; at hydrants, 245; complaints on, 246; Interruptions of service, 246. Extensions: 250, 251, 252, 253, 254; necessary, 268; cost of, 291; Street work: done by contract and direct employment, 251; permits for, 256, 257; Water used in puddling ditches, 255. Care of trenches, 255; Maps, 256. Underground structures: locating, 256; protecting, 272. Purchase of supplies, 257-62. Plant and equipment: adequate for business, 262, modernity and efficiency of, 264, care of, 269; Offices not conveniently located, 269. Handling of complaints, 269, 270; Badges, 271; Harmony between dep'ts, 271, Telephones, 271, Guarding at night, 272, Attendance at fires, 272; No drafting room, 273; Tools, 273. Attention to orders to turn on water, 274; Work in houses, 276, 277; Fire insurance rates, 283, Water tax and fees, 283; City water used for drinking, 283, 291, 301-2. Cost of a comparable unit of service, 283-4. Description of city, 335; Submerged pipe, [illegible]; Gate-house and dam, 338-9. Conduit line, 339. Woodland reservoir, 339-40; Collection of bills, 361, 362, 363; Accounts: system of, 364, 365-6, expenses not charged, 366, 367-8; credits not made, 368, 371; charging of materials, 372. Free service, [illegible], 371, [illegible] Interest rate compared with companies, 374-5; Appropriations for, 374-5; Liabilities: cancelled, 376; provision for payment of, and interest, [illegible] present, 417. Records of costs of construction work, 383. Coal used, 383. Funds raised other than by bonds, [illegible] Assets, 416; Receipts, 417, [illegible] Expenses, 417-19, 424-5. Profit and loss account, 419, 421-2, [illegible] Surplus account, [illegible] 422-3. Authority of governing body, [illegible] Chief executive officer and head of engineering service, [illegible] Salaried officers, [illegible] Employment, [illegible] Promotions, [illegible] Political conditions, [illegible] Conditions of suffrage, [illegible] Employee voters, [illegible]

Syracuse Water Co.: History of, 3-4, 5-7.

Taunton municipal electric works: see Massachusetts Electric Works.

Taxation: Power of cities of, for works: water, 17-20; Chicago water, 25; Wheeling gas, 433, 442; electric, 681-2, 697; Mass. electric, 922, 936; Payments to lighten, by Syracuse waterworks, 46; Of companies, by state: water, 75-7, 81; gas, 454-6; Mass. electric, 939; Local, of companies: water, 77-81, 82, 95; gas, 456-7; electric, 710-12; Mass. electric, 939-40; Franchise provisions on: Rogers Park Water Co., 112; gas, 481-3; Limit on Wheeling's power of, 434; Right of cities to contract as to, of gas companies, 471-2; Taxes lost to cities because of municipal waterworks: Chicago, 280-1; Cleveland, 283; Syracuse, 284; Water tax and fees in Syracuse, 283; Charges for taxes on waterworks, 376-7, 378-9, 381; Taxes paid by gas companies: 447; on franchises, 458; Charging of taxes on electric companies, 809, 810; Taxes omitted from accounts of electric works, 818, 819, 820; Determination of taxes, as a charge against Chicago electric works, 867.

Teal, Oliver: early water supply of Syracuse furnished by, 2, 3, 336.

Teal, Seymour and Burt: furnishers of Syracuse water supply before 1819, 3.

Telephones of works: water, 271-2; gas, 559; electric 797; Mass. electric, 1095.

Tools, and care of by works: water, 273; Philadelphia gas, 523-4; gas, 560-1; electric, 799; Mass. electric, 1097-8.

Transformers of electric works: 764-5, 771; Massachusetts, 1002-3, 1018-28, 1028-31.

Tunnels of waterworks: Appraisal of, in Chicago, 188-9; Chicago, 317; Cleveland, 329-34.

Typhoid fever in cities: Cleveland, 57, 210, 221, 223; Syracuse, 223; New Haven, 213-14, 223; Chicago, 223, 259-60; Indianapolis, 223, 286.

Underground structures of works: Locating: water, 256; gas, 555; electric, 788; Mass. electric, 1084; Protecting: water, 272-3; gas, 560; electric, 798; Mass. electric, 1096.

Uniforms of employees: see Badges.

Unions, trade: Influence of, on wages of Chicago municipal employees, 144; Relation of, to Cleveland waterworks, 149-52; Political influence of, in Wheeling, 494; In Richmond, 497; Employees of works not members of: Atlanta gas, 498; South Norwalk electric, 750; Action of, on campaign assessments in Allegheny electric works, 753; In electric works: Detroit, 755, 756, 757; Massachusetts, 980.

United Gas Improvement Association of Philadelphia: see also Philadelphia gas works; Purchase of Atlanta gas companies, 429, 431-2; Report on personnel of Philadelphia gas works under lease to, and under municipal operation, 500-36; Operations in Philadelphia: mains laid, 1898-1905, 610, 611; water gas contract with city, 1888, 618 ff.; leasing of works from city, 643-4; terms of lease, 644 ff.; expenditures for improvements, etc., 1897-1905, 649; payments to city, 1898-1905, 650; service under lease, 651-2; ordinance authorizing and form of lease, 652-64.

United States Cast Iron Pipe and Foundry Co.: letter relative to breaks in mains in Indianapolis, 312-4.

Uxbridge and Northbridge Electric Co.: see Massachusetts Electric Works.

Vacations and holidays of employees of works: Water: Chicago, 139-40, 145-6; Indianapolis, 156; Gas: Richmond, **497**; Atlanta, 499; Electric: South Norwalk, 750; Allegheny, 754; Detroit, 758; Massachusetts, 973-4.

Valves of waterworks: 184; Chicago, 321-2, 324.

Ventilation of works: water, 269; gas, 557; electric, 795; Mass. electric, 1091.

Virginia Electric Co. (Norfolk): charter, 428; purchase of electrical machinery of City Gas Co. of Norfolk, 428, 431.

Virginia Corporation Commission: see State Corporation Commission of Virginia.

Virginia Oil and Gas Co. (Wheeling): Franchise of, 476; Franchise provisions: forfeiture, 477-8; time of construction, 479; rates, 479-80; forbidden to sell gas for illuminating, 480; plant and equipment, 480; free service to city, 483.

Voltage of electric works: 783-4; Massachusetts, 1073-4.

Wages of employees of works: see also Salaries; Water: Cleveland, 50; Syracuse, 51-2; fixing of, 52-3; Chicago, 144-6; Indianapolis, 157; Wheeling gas: fixing of, 441; dependent on politics, 494; paid, 494-5; Richmond gas, 496-7, 500; Atlanta gas, 498-9, 500; Philadelphia gas: increase in, by company, 509; equalization of, 510-11; paid, 535-6; per M. cu. ft., 1886-97, 603; Electric: South Norwalk, 750; Allegheny, 754; Detroit, 756-8; All works, 897-9, 902-8; Mass. electric: paid, 956-60, 967-71; payment and fixing of, 978-9.

Wallace, George M.: tables by, showing capitalization and amount of dividends paid on water stock of New Haven Water Co., 133-4.

Water used by works: Wheeling gas, 574; Electric: 822; Chicago, 1888-1905, 867-8, 884; Massachusetts, 1130.

Water Works Company of Indianapolis: history of, 9, 10, 340-1.

Waterworks, reports on: History and Legislation, 1 ff.; Labor and Politics, 136 ff., 885 ff.; Engineering Matters, 159 ff.; Financial Matters, 353 ff.

Welfare work of works: Chicago electric companies, excellent, 147; Cleveland water, 149; Indianapolis water co., 156-7; Philadelphia gas, 514-16; Mass. electric, 977-8.

West Haven Water Co.: purchase by New Haven Water Co., 15.

Westfield municipal electric works: see Massachusetts Electric Works.

Wheeling Electric Co.: power of city to purchase, 435.

Wheeling Gas Co.: origin, and date of municipalization, 427; municipalization, and contest of award of arbitrators, 427-8; charter powers, 434-5.

Wheeling municipal gas works: sources for report on legislation, 426; Date of beginning supply, 426; Original and present character, 426, 427; Origin of company and date of municipalization, 427; Municipalization, 427, 429, 435; Contest of arbitrators' award, 428; Political influence on, 429; Political assessments of employees, 429-30, 490; Sentiment toward, 429, 430; Competition: with natural gas, 430-1, 493; electric works, 432; Population of city, 432; Public electric plant: 432; expenses of, paid by gas works, 571; Powers of city as to works: construction, 433; operation, 433, 479; to borrow, 433-4; taxation, 434, 442; rates charged, 442; Charter powers of Wheeling Gas Co., possessed by city, 434-5; Procedure for construction or acquisition of works, 434-7; Ordinances for management of, [illegible]. Power of city to sell electricity, [illegible]. Power to purchase Wheeling Electric Co., [illegible]. Taxes none paid, [illegible]; if a company, [illegible]. Powers of city as to private plants: purchase, 437, eminent domain, 437, acquisition, 467; operation of plants acquired, 439. Area to be served, 437. Statutory provisions: plant and equipment, 437-8, depreciation, [illegible]. Rates and discounts, 438, for meters and appliances, [illegible]-9; before and after municipalization, [illegible], changes in, [illegible]. Regulation of service, 438. Doing work by contract or direct employment, 438-9. Letting contracts, 439. Use of income, 439-40. Publication of reports, 440-1. Wages and salaries: fixing of, 441, and trade unionism dependent on politics, 494, before and after municipalization, 891-5, of governing bodies, [illegible], chief executive officers, 892. Hours, 441. Laws relating to and private works, 441-2. Power of council as to, 441-2. Accounts: publicity of, 442. Audit, [illegible], system of, [illegible], 570; charging of particular items, 570; expenses not charged, 570, 572-3, credits not made, 573-4, no storeroom account, 571; [illegible] in, 577, destruction of, 577; unreliability of financial statement, 586. City's power as to franchises: granting, 466, alienation, 466, forfeiture, 466; compensation for, 472; transfer of, 473; Procedure for granting franchises, 469. City's power as to companies: streets to be used, 469-70, plant equipment and extensions, 469, time of construction, 469, 470, monopoly rights, 470, rates for service, 471, regulation by city, 471, taxation, 471, paving, and removal of mains, 472; issuance of stock and bonds, 472, records and audit, 472, labor matters, 474, enforcement of, 475; Duration and renewal of franchises, 466, 471. Property owners' consent, 469. Gas franchises in force, 476. Forfeiture of franchises, 477-8. Franchise provisions on purchase of Natural Gas Co. of West Virginia, 478. Franchise provisions, time for construction, 478, rates, 479-80; [illegible] to sell gas for lighting, 480, plant and equipment, 480; [illegible] 480. Taxation of companies, 481. Free service by companies, 481. Difficulties with natural gas companies, 481-2. Suit of city vs. Henry for using natural gas for lighting, 482. Cost of [illegible] report of J. C. Baxter on, [illegible]; estimated by engineers, 542. Corruption, publicity and scandal in granting franchises, 482-4. Drafting of franchises, [illegible]. Gas trustees: works [illegible] by, [illegible]; organization and selection of, [illegible]. Committees elected of, [illegible]; controlled by brewery and franchise interests, [illegible]; bribery of, [illegible]; [illegible] by, [illegible]. Political activities of street car companies, 491-2. City Hall ring, [illegible]. Political influence in selection of employees, [illegible]; election of trustees, [illegible]; appointments, 494. Proposition in council to sell works to company, 493. Responsibility for depreciation of works, 493; Surplus: for repairs, 493, account, 583, 586; Suit of city vs. natural gas co., 493-4; Coal: unnecessary expense for hauling, 494; used, 574; Trade unions, 494; Strike of gasworkers, 494; Employees: 495; character of, 559, 16 months covered by investigation, 537, 568; Process of gas making and purifying, 537; Coal gas works, 537; Purifying plant, 538; Holders, 539-40; Mains, 540; Meters: 541; tests of, 546; Services: 541, 542, 543; work on, prior to paving, 554, 561; no records of, by date, 561; Lamps: public, 541, ownership of posts, 575; No stoves or appliances rented, 541; Appraisal: 542; In event of competition with natural gas, 565 ff.; Consumption: 543-4; per capita, 545, 546; Leakage, 543; Free service, 543, 571, 896, 897; Output, 544; Means to extend business, 547; Kind of gas supplied, 547; No air mixed with gas, 547; Candle power, 548, 549; Pressure, 550, 551; Extensions, 552, 553; Street work: 554; permits for, 555; Underground structures: locating, 555; protecting, 560; Purchase of supplies, 555, 556; Adequacy of plant, 556; Condition of plant and equipment, 557; Ventilation, and guarding of machinery, 557; Location of offices, 557; Handling of complaints, 557, 558; Harmony between dep'ts, 559; Attendance at fires, 559; Reports of operation to manager, 560; No drafting room, 560; Care of tools, 560, 561; Attention to orders to turn on gas, 561; Work in houses: regulations on entrance, 561; no inspection of, 565; Collection of bills, 568, 569; Interest rate compared with companies, 571-2, Appropriations for, 572; Liabilities: cancelled, 572, present, 578-9; Depreciation, 572-3; Records of expenditures on construction work, 574; Water used, 574; By-products, 574-5; Bonds: 572; paid, 576-7; Assets, 577-8; Receipts, 579-80; Expenses 580-2; Profit and loss account, 582-3, 584-6; Supplementary report on financial matters, 586 ff.; Revenue city appropriations, and application of, since 1871, 587; Organization, 886 ff.; Meetings of trustees, 888; Authority of governing body, 888, 889, 890. Chief executive officer and head of engineering service, 889, 890, 891, 892. Salaried officers, 892, Employment, 893, 894, 896. Promotions, 894; Political conditions, 895 ff.; Suffrage, 895; Employee voters, 896.

Whitney, Eli: contractor for publicly-owned waterworks of New Haven, 121; suit of, vs. New Haven for non-performance of contract, 121; constructor of system of New Haven Water Co., 122-3; statement of, as to stock issues of New Haven Water Co., 131-5.

Winchester, A. E.: career of in connection with South Norwalk electric works, 667-8.

UNIVERSITY OF TORONTO
LIBRARY

Do not remove the card from this Pocket.

Acme Library Card Pocket
Under Pat. "Ref. Index File."
Made by LIBRARY BUREAU, Boston

Title Municipal and Private operation of public utilities.
Vol.1. Pt.2.

DATE.	NAME OF BORROWER.
June 7 34	Ladd
Jl. 12. 33	S. A. R. Wood Stud.

UTL AT DOWNSVIEW
D RANGE BAY SHLF POS ITEM C
39 13 12 12 14 013 9